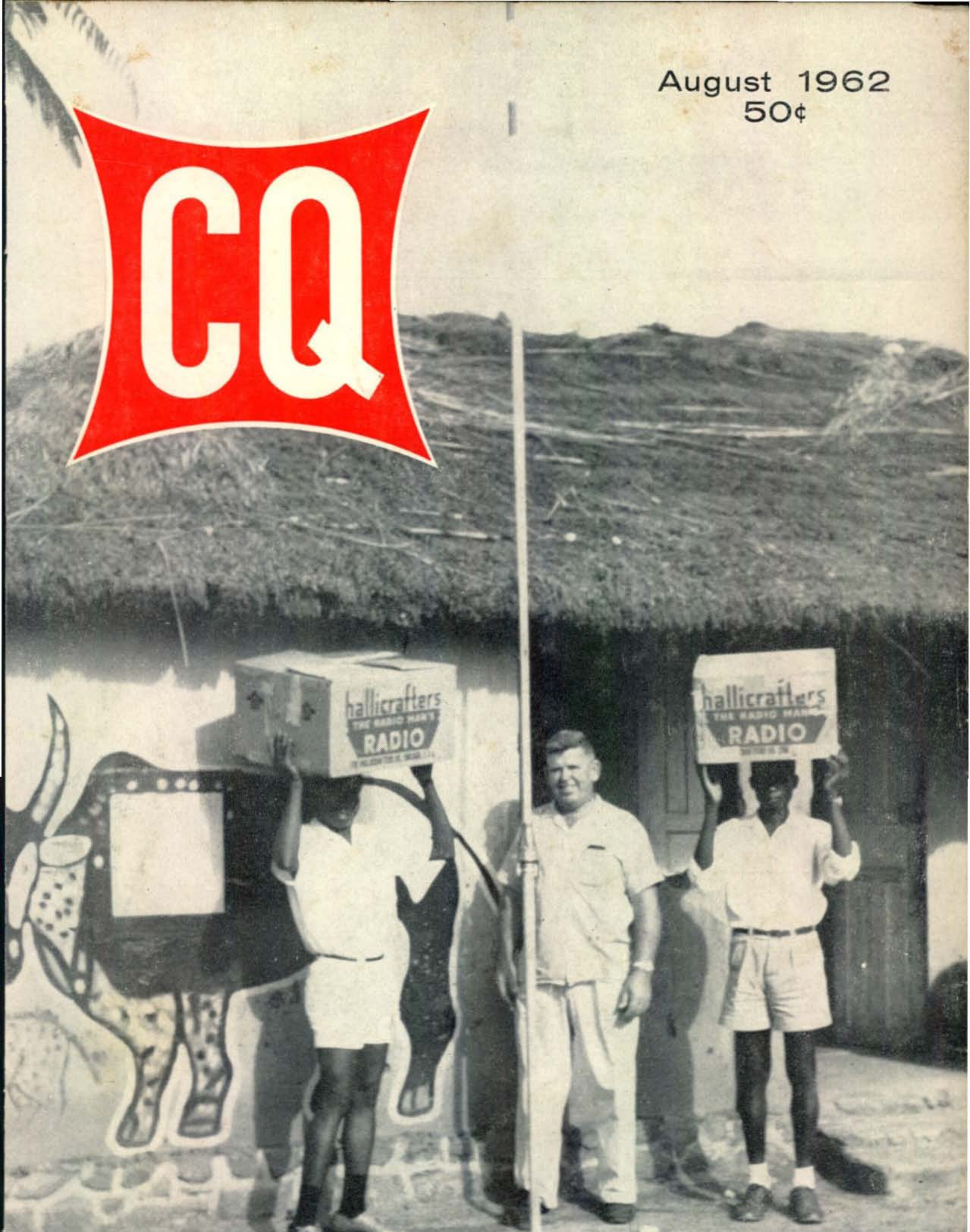
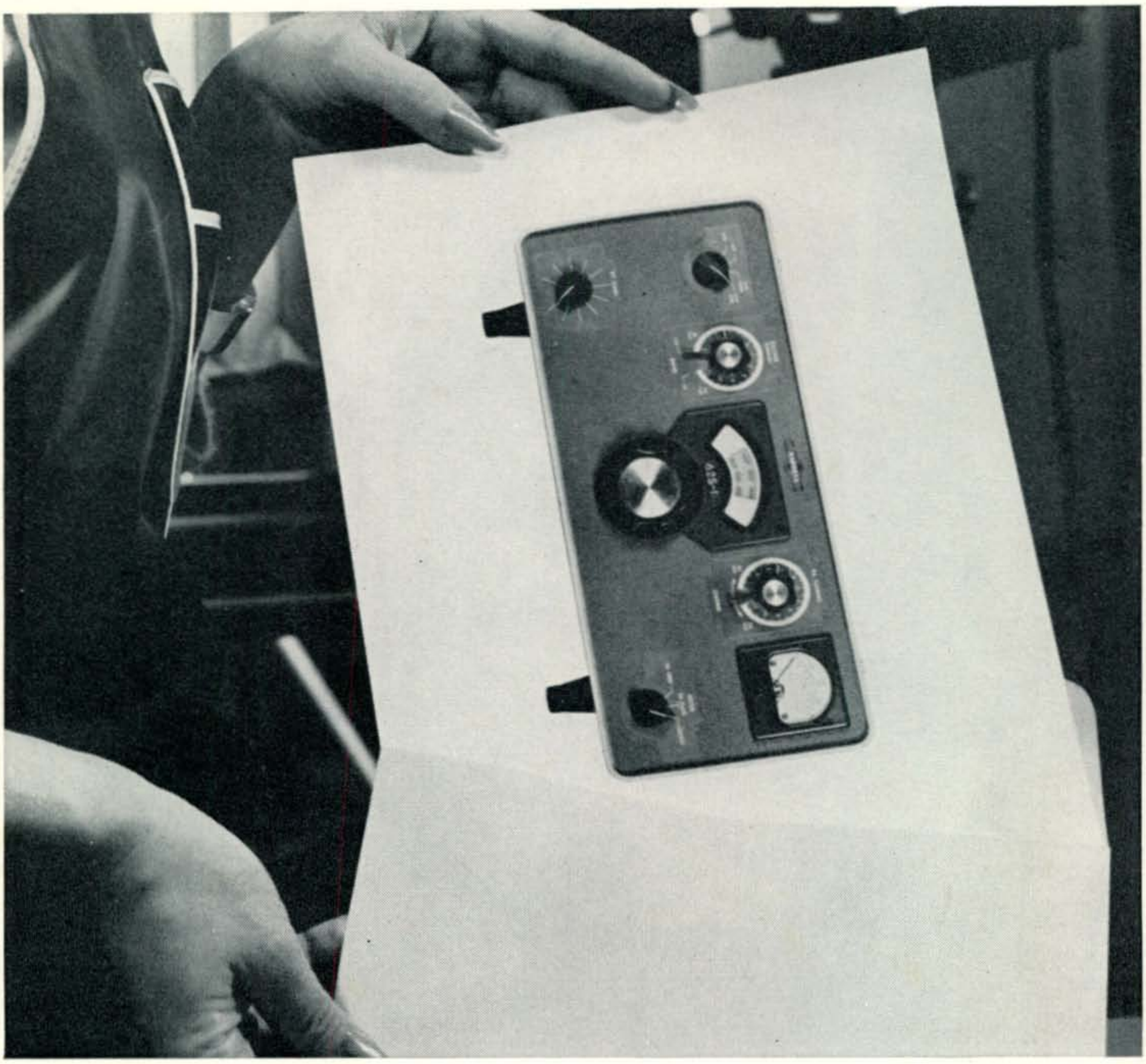
August 1962
50¢

CQ



WØMLY / AFRICA

The Radio Amateur's Journal



OUT OF THE LAB . . .

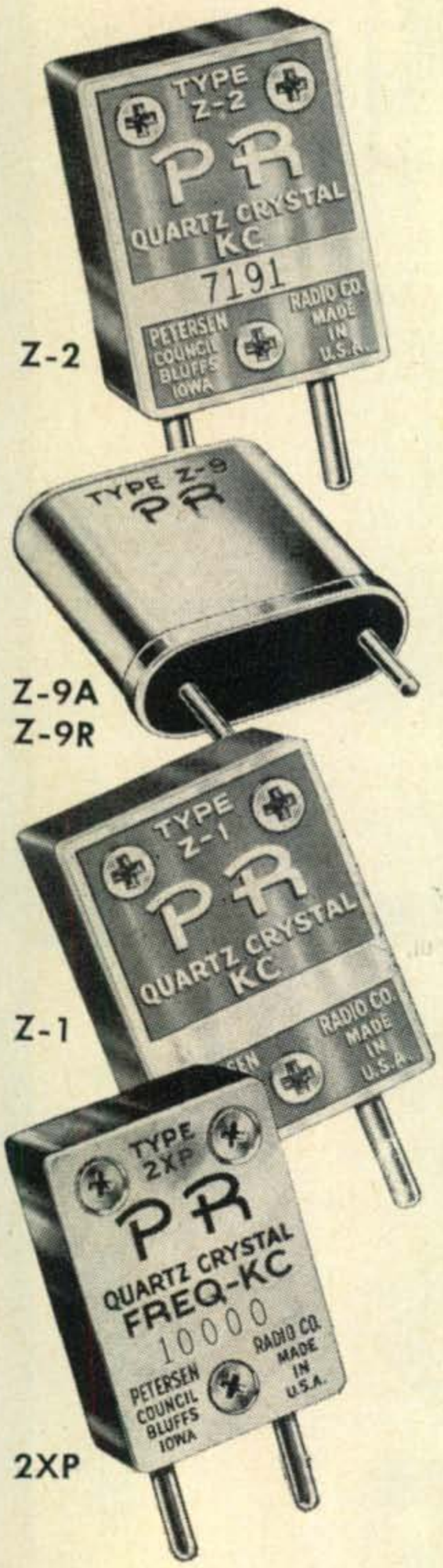
AND READY FOR PUBLICATION! Collins new 62S-1 VHF Converter is *almost* ready for your inspection. ☐ The Converter will more than double your present frequency coverage by giving you full 6 and 2 meter operation. ☐ Priced at $895, the 62S-1 will be available for delivery in December. ☐ The Converter, which may be used to cover 49.6 to 54.2 mc and 143.6 to 148.2 mc (crystals for amateur bands furnished), provides transmit and receive functions in the 14.0-14.2 mc range with the 32S, 75S, and KWM series. ☐ There is no cable changing (you flick a switch) when moving from HF to VHF. ☐ The self-contained (using exciter's high voltage) unit supplies a 3 to 5 db noise figure on receive and 160 watts PEP on transmit. ☐ Crystal switching from the front panel tuning knob provides a choice of any one of twenty-three 200 kc bands in the 6 and 2 meter range. ☐ Keep in touch with your distributor for date of display. **See the 62S-1 at the Western SSB Convention September 28 in Santa Barbara.**

COLLINS

For further information, check number 1, on page 126

It pays to insist on PR *crystals*

STANDARD OF EXCELLENCE SINCE 1934



Z-2

Z-9A
Z-9R

Z-1

2XP

AMATEUR TYPES

Fundamental, PR Type Z-2

Frequency Ranges in Kcs.: 3,500 to 4,000 (80M); 7,000 to 7,425 (40M); 8,000 to 8,222 (2M); 8,334 to 9,000 (6M).

Rugged. Low drift, fundamental oscillators. High activity and power output. Stands up under maximum crystal currents. Stable, long-lasting; ±500 cycles..... **$2.95** Net

(All Z-2 Crystals calibrated with a load of 32 mmfd.)

Third Overtone, PR Type Z-9A

Hermetically sealed; calibrated 24,000 to 24,666 and 25,000 to 27,000 Kc., ±3 Kc.; .050" pins..... **$3.95** Net

6 Meters, PR Type Z-9A

Fifth overtone; for operating directly in 6-meter band; hermetically sealed; calibrated 50 to 54 Mc., ±15 Kc.; .050" pins. **$4.95** Net

CITIZENS BAND CLASS "D" Type Z-9R, Transmitter

FCC assigned frequencies in megacycles: 26.965, 26.975, 26.985, 27.005, 27.015, 27.025, 27.035, 27.055, 27.065, 27.075, 27.085, 27.105, 27.115, 27.125, 27.135, 27.155, 27.165, 27.175, 27.185, 27.205, 27.215, 27.225, 27.255, calibrated to .005%. (Be sure to specify manufacturer and model number of equipment) **$2.95 Net**

CITIZENS BAND CLASS "D" Type Z-9R, Receiver

Specify I.F. frequency, also whether receiver oscillator is above or below transmitter frequency. Calibrated to .005%. (Be sure to specify manufacturer and model number of equipment.)..... **$2.95 Net**

Type Z-9R, Radio Control

FCC assigned frequencies in megacycles: 26.995, 27.045, 27.095, 27.145, 27.195, 27.255; calibrated to .005%. (Be sure to specify manufacturer and model number of equipment.)..... **$2.95 Net**

Type 2XP

Suitable for converters, experimental, etc. Same holder dimensions as Type Z-2.

1600 to 12000 Kc., (Fund.) ±5 Kc..... **$3.45** Net

12001 to 25000 Kc. (3rd Overtone) ±10 Kc..... **$4.45** Net

ALL PR CRYSTALS ARE UNCONDITIONALLY GUARANTEED. ORDER FROM YOUR JOBBER.

COMMERCIAL TYPES

Commercial Crystals available from 100 Kc. to 70 Mc. Prices on request.

Type Z-1, MARS and CAP

Official assigned frequencies in the range. Calibrated to .005%.

1600 to 10000 Kc..... **$3.45** Net

Type Z 1, TV Marker

Channels 2 thru 13.... **$6.45** Net

4.5 Mc. Intercarrier, .01%..... **$2.95** Net

5.0 Mc. Signal Generator, .01%..... **$2.95** Net

10.7 Mc. FM, IF, .01%..... **$2.95** Net

Type Z-6A, Frequency Standard

To determine band edge. To keep the VFO and receiver properly calibrated.

100 Kc. .. **$6.95** Net

Z-6A

PETERSEN RADIO CO., *Inc.* 2800 W. Broadway

COUNCIL BLUFFS, IOWA

EXPORT SALES: Royal National Corporation, 250 W. 57th Street, New York 19, N. Y., U. S. A.

For further information, check number 2, on page 126

INTERNATIONAL **AMATEUR CRYSTALS**

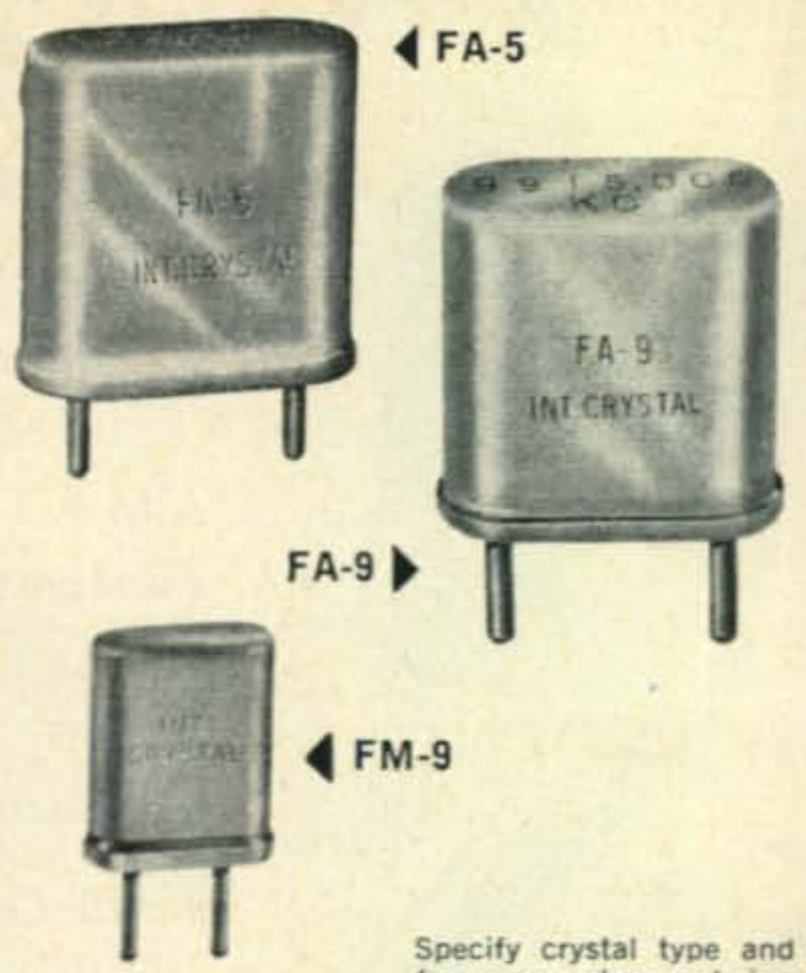
Amateurs throughout the world depend on International crystals for precision frequency control.

Manufactured by the same highly skilled craftsmen who produce International commercial crystals for the broadcast industry, two-way radio communication, and our space and missile program.

International Amateur Crystals
1000 kc to 137 mc — .01% tolerance

Wire mounted, plated and hermetically sealed in metal holders. FA-5 and FA-9 are HC/6U pin type. The FM-9 is an HC/18U pin type.

Priced from $3.30 to $10.00



Specify crystal type and frequency when ordering.

	FA-5 and FA-9	FM-9
Fundamental	* 1000 - 1499 kc	Not available
	* 1500 - 1799 kc	Not available
	* 1800 - 1999 kc	Not available
	2000 - 9999 kc	8000 - 9999.999 kc
	10000 - 14999 kc	10000 - 15000 kc
	15000 - 20000 kc	15001 - 19999.999 kc
Overtone (3rd)	10 - 14.99 mc	Not available
	15 - 29.99 mc	20 - 39.99 mc
	30 - 59.99 mc	40 - 59.99 mc
Overtone (5th)	60 - 75.99 mc	60 - 89.99 mc
	76 - 99.99 mc	90 - 100 mc
	Not available	101 - 109.99 mc
Overtone (7th)	100 - 137 mc	110 - 137 mc

* Allow three to four day processing.

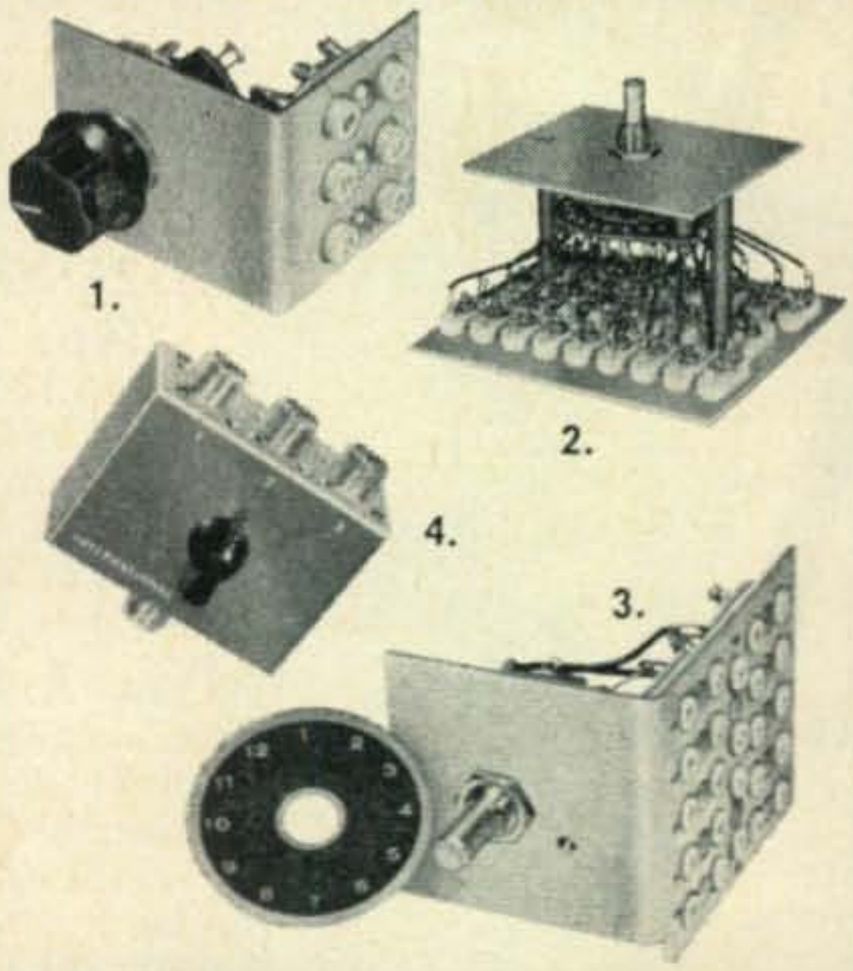
the **PERFECT** combination

for **FREQUENCY CONTROL**

INTERNATIONAL **CRYSTAL SWITCHES**

When you design or build . . . combine International crystals and crystal switches. Switches available from 3-position to 24-position. For antennas and laboratory work use International coaxial switches.

Priced from $2.75 to $19.50



1. S-121 Triple Socket Crystal Switch. Cat. No. 150-126.
2. AC-44 Single Pole, 24-Position Crystal Switch. Cat. No. 150-131.
3. 12-Position Crystal Switch. Cat. No. 150-163.
4. 3-Position Coaxial Switch. Cat. No. 100-112.

Write today for International's Free catalog of precision made crystals and equipment.

INTERNATIONAL CRYSTAL MFG. CO., INC.

18 NORTH LEE • OKLAHOMA CITY, OKLAHOMA

For further information, check number 3, on page 126

CQ The Radio Amateur's Journal

VOL. 18, NO. 8 AUGUST 1962

EDITORIAL STAFF

Editor
A. S. TROSSMAN, W2DTJ

Associate Editor
RICHARD A. ROSS, K2MGA

Technical Editor
IRVING TEPPER

Contributing Editors

Contest Calendar
FRANK ANZALONE, W1WY

Novice
WALT BURDINE, W8ZCV

USA-CA Custodian
CLIF EVANS, K6BX

Propagation
Space Communications
GEORGE JACOBS, W3ASK

RTTY
BYRON KRETZMAN, W2JTP

DX
URB LE JEUNE, W2DEC

YL
LOUISA B. SANDO, W5RZJ

Ham Clinic
C. J. SCHAUERS, W4VZO

V.H.F.
DON STONER, W6TNS

Sideband
DOT STRAUBER, K2MGE
IRVING STRAUBER, K2HEA

BUSINESS STAFF

Publisher
S. R. COWAN

Advertising Representatives
JACK SCHNEIDER, WA2FPE
DICK COWAN, WA2LRO

Circulation Manager
HAL WEISNER, WA2OBR

Production Manager
CARY L. COWAN

OFFICES

300 West 43rd Street
New York 36, N. Y.
Telephone, JUdson 2-4460

CQ—(Title registered U.S. Post Office) is published monthly by Cowan Publishing Corp. Second class postage paid at New York, N. Y. and at Garden City, New York. Subscription Rates: U.S.A. and Possessions, APO, FPO, Canada and Mexico: one year $5.00; two years $9.00; three years $13.00. Pan-American and foreign, one year $6.00; two years $11.00; three years $16.00. Printed in the U.S.A.

Entire contents copyright 1962 by Cowan Publishing Corp. *CQ* does not assume responsibility for unsolicited manuscripts.

Postmaster: send Form 3579 to *CQ*, 300W. 43rd St., N. Y. 36, N. Y.

TABLE OF CONTENTS

One Tube, 30 Watts.....*E. H. Marriner, W6BLZ* 26

The "Scan-Pan" Panoramic Adaptor
Fred Johnson, ZL2AMJ 28

Adapter for the KWM-1 to 40 Meters
Tal Lawrence, W5GVZ 32

Return to Aves Island.....*Julio Pena, YV3BS* 35

A V.H.F. Man's Control Unit
Richard L. Turner, K7MRB 37

Results of the 3rd Annual *CQ* 160 Meter C.W. Contest ....*Charles M. O'Brien, W2EQS/FP8AS* 39

Practical Pi-Network Design Data
E. H. Marriner, W6BLZ 44

One Knob Madness .....*J. Worthington, G3COI* 46

32S-1 Operating Improvements
P. C. Kreager, W6UYW and M. H. Gonsior, W6VFR 47

Notes on the BC-221
Herbert W. Gordon, W1KWB/W1IBY 52

DXpedition to Africa
George R. (Dick) McKercher, WØMLY 57

Two-Signal Selectivity Measurements
Al Brogdon, W4UAW 60

How The Coax Phase Detector Works
David T. Geiser, WA2ANU 62

Kilowatt R.F. Transistors *Donald L. Stoner, W6TNS* 64

New Amateur Products
Power Distribution Strips 63

Twirl-Con 63

DEPARTMENTS

Announcements	16	QSL Contest	22
Contest Calendar	70	RTTY	96
DX	66	Sideband	72
Ham Clinic	91	Space Communications	75
Ham Shop	112	USA-CA	86
Letters	12	VHF	79
Novice	82	YL	98
Propagation	76	Zero Bias	7

hallicrafters is 1st.

R-47 Speaker. HA-4 Keyer
HT-32B Transmitter SX-115 Receiver HT-33B Linear Amplifier

The time-proven excellence of hallicrafters' HT-32B and HT-33B . . . the incomparable performance of the new SX-115 . . . the HA-2 and HA-6 transverters . . . and the fully transistorized HA-4 electronic keyer . . . now team up to bring you maximum flexibility and full coverage of 80 through 2 meters on SSB, CW and AM.

with 80 through 2

in one complete SSB/CW/AM station!

Examine these outstanding features

HT-32B TRANSMITTER.
FEATURES: Beam-deflection, high level sideband modulator for low-noise, high-stability signal, Hallicrafters' exclusive 5.0 Mc. quartz crystal filter with sideband rejection of 50 db. or more; CTO direct reading in kilocycles to within 1 kc.; 144 watts plate input (P.E.P. two-tone). Five band output (80, 40, 20, 15, 10 meters). All modes of transmission—CW, AM, SSB. Unwanted sideband down 50 db. or more. Both sidebands transmitted on AM Precision gear driven CTO. Exclusive Hallicrafters patented sideband selection. Logarithmic meter for accurately tuning and carrier level adjustment. Ideal CW keying and break-in operation, push-to-talk and full voice control system built in. Keying circuit brought out for teletype keyer.

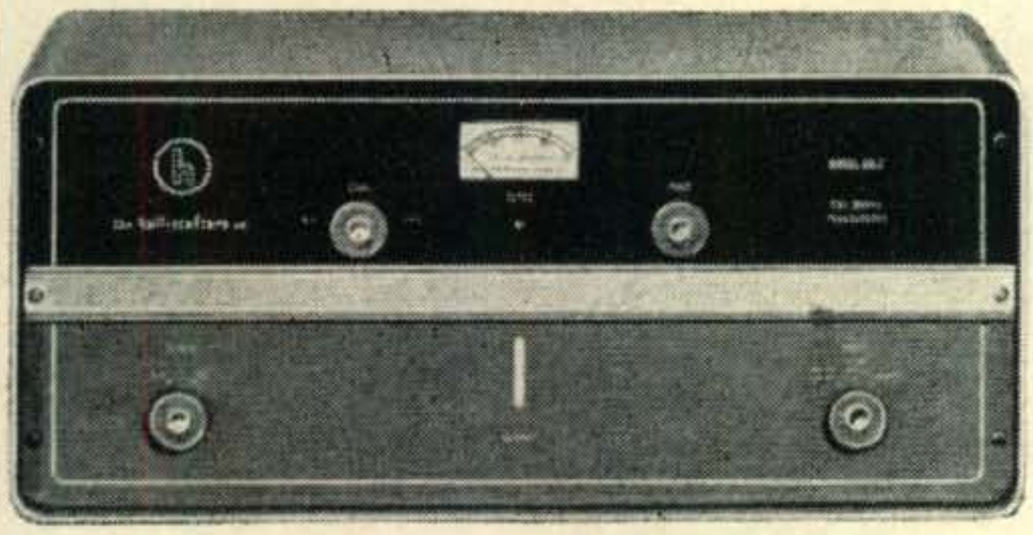
HT-33B LINEAR AMPLIFIER.
FEATURES: Rated conservatively at the maximum legal input. Third and fifth order distortion products down in excess of 30 db. Built-in R.F. output meter greatly simplifies tune-up. All important circuits metered. Maximum harmonic suppression obtained through pi-network. Variable output loading. Protection of power supply assured by circuit breaker. HT-33B is a perfect match to Hallicrafters' famous HT-32B in size, appearance and drive requirements. *CIRCUIT DETAILS:* This power amplifier utilizes a PL-172 high efficiency pentode operating in class AB1. The tube is grid-driven across a non-inductive resistor, thus assuring the maximum stability under all possible conditions. Band switching is accomplished by one knob which selects the proper inductance value for each band. The output circuit is a pi-network with an adjustable output capacitor, accommodating loads from 40 to 80 ohms. 2 panel meters are provided: one is circuit switched to measure grid current, screen current, plate voltage and R.F. output voltage. A second meter continuously monitors cathode current of the PL-172.

SX-115 RECEIVER.
FEATURES: High order of mechanical and electrical stability; linear tuning; constant tuning rate; separate noise limiters for SSB/CW/AM; amplified dual loop AVC with fast attack-slow release; spurious signal and image rejection better than 60 db. 1 kc calibration marks; transmitter-type VFO with differential TC; 100 kc crystal calibrator; crystal controlled 1st and 3rd conversion oscillators; selectable sidebands; selectivity variable in five steps from 500 to 5000 cycles; product detector for SSB/CW envelope detector for AM; I.F. type noise limiter for SSB/CW automatic threshold series type for AM; band gain equalization; audio inverse feedbacks; "S" meter functions with AVC off. *SENSITIVITY:* Less than 1 microvolt on AM—less than ½ microvolt on SSB/CW. *FREQUENCY COVERAGE:* Nine 500 kc segments covering 3.5-4.0 Mc.; 7.0-7.5 Mc.; 14.0-14.5 Mc.; 21-21.5 Mc.; 28.0-30.0 Mc.; (4 segments); and WWV.

HA-2—HA-6 TRANSVERTERS. A sensible, new approach to VHF operation! Engineered with the usual Hallicrafters precision, these transverters will convert your present 10-meter station to VHF . . . AM, CW, SSB, RTTY, FM capability. All modes of transmission and reception on your present equipment are useable with these units. A nuvistor front end in the receiver section provides excellent sensitivity and noise figure.

FEATURES: Converts received VHF signals down to 10 meters for reception. Converts 10-meter signal to VHF for transmission. 5894 tube in transmitter final amplifier can be driven up to 120 watts input. Can be driven by exciters with 10 to 100 watt capability. Built-in coaxial antenna relay.

HA-4 "T.O." KEYER. Compact design, employs digital techniques. Fully transistorized. **R-47 SPEAKER.** Designed for communications. Flat response from 300 to 2850 cps. Input impedance: 3.2 ohms.



HA-2—HA-6

The new ideas in communications are born at...

hallicrafters

Overseas Sales: Contact Hallicrafters Commercial Products Division. Canada: Gould Sales Co., Montreal, P.Q.

For further information, check number 4, on page 126

Gonset gets its second OSCAR

When OSCAR II was launched on June 1st Gonset Communicator IVs were standing by in tracking stations throughout the world – from London to Sunnyvale, from Rome to Auckland – to monitor and track the satellite.

As with OSCAR I, participating tracking stations had specified, as an integral part of the program, the use of Gonset equipment.

Gonset is proud of this significant achievement by the nation's amateurs – proud, too, of the part we have played in advancing man's knowledge and establishing the increased importance of the amateur in America's defense program.

The fact that Gonset has been called upon repeatedly to serve in such important national programs – where unquestioned reliability is a must – is further evidence that, for more than a quarter of a century, the best in amateur communications equipment bears the Gonset name.

Get the facts on the Gonset Communicator IV. We're sure you'll agree that it's the finest communicator made for either 2, 6, or 220.

GONSET®
DIVISION OF YOUNG SPRING & WIRE CORPORATION
801 SOUTH MAIN STREET, BURBANK, CALIFORNIA

For further information, check number 5, on page 126

ZERO BIAS

ONE of the newest topics of conversation heard recently on the amateur bands, especially on six and two meters, is that of the Technician licensee obtaining operating privileges in the 28 mc band.

It is not our intention this month to express an opinion on this subject, either pro or con. It *is* our aim however, to review a few of the reasons why the Technician should or should not be granted 10 meter privileges.

Due either to the ease with which Technicians can now obtain their examination (not taken at an FCC field office) or perhaps the magical lure of the v.h.f. spectrum, Technician class licenses are now being issued at an ever increasing pace. This indicates that the Technician now plays a far greater role in amateur radio rank-and-file than years previous.

Specialized amateur publications have sprung up lately, devoting a great deal, if not all their content to the Technician licensee. Apparently, the Technician now requires a little more room for "spreading out" and ten meters seems the logical band for expansion since a good deal of the activity on that band has disappeared with the decrease in sunspot activity.

With the exception of the code requirement, the Technician is technically as hep as his "higher-class" counterpart. Should the c.w. demand be a criterion for determining band usage? The Citizens radio service, too, is eyeing 10 meters with a sinister grin and to permit operation on 28 mc by the Technician would curtail, or at least dampen thoughts in that direction.

On the other hand, the original reason for initiating a Technician-class license, with its reduced license requirements and reduced band utilization was to allow engineers, or engineering-type personnel to perform experiments in the very-high and ultra-high frequencies. Six meters, eleven years ago, when the Technician license was inaugurated, was a rather quiet, inactive band, frequented only by the ambitious few. Today, it is one of our most popular meeting places and it appears that the original purpose of the Technician-class license has been forgotten.

Six and two meters appears to provide the Technician class amateur with a suitable and well rounded outlet for a communication media and many General class amateurs argue that a great many Technicians have lost all incentive to seek outlets on the lower frequencies. They say, that to hand over the 10 meter band to the Techs at this time would only hinder their incentive still further.

Since this situation is a rather controversial one, requiring a good deal of thought and consideration; we herewith solicit comments on this subject from our readers.

OUR COVER

Dick McKercher, WØMLY is now on an extended DXpedition in Africa, and is providing the gang with a new group of exotic calls. Part I of Dick's African Safari begins on page 57.

YOUR DREAM ANTENNA FOR 10-15-20-40 METERS WITH A PLANNED BUDGET

Start today with the purchase of the inexpensive Model TA-31, and in three additional steps you can have the famous MOSLEY TA-33 TRAPMASTER BEAM plus the New TA-40K to add 40 Meters.

Amateur Net *$25.85*

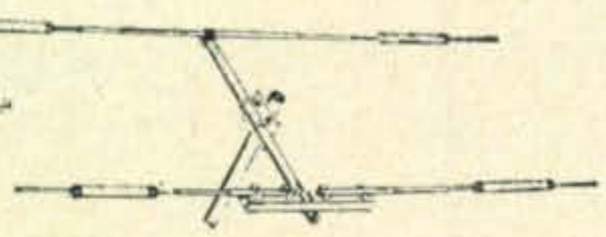
1 MODEL TA-31

NEXT purchase the Kit to convert the TA-31 to a TA-32. Kit consists of reflector element, seven foot boom and all necessary hardware.

Amateur Net *$43.65*

+ Mosley TA-31/32 Conversion Kit

2 MODEL TA-32



This extra element gives your Antenna additional gain and directivity over the single rotatable dipole.

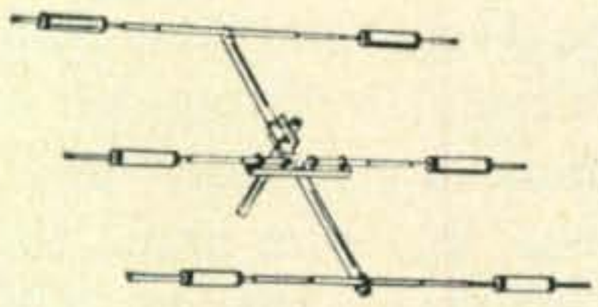
Amateur Net *$69.50*

+ Mosley TA-32/33 Conversion Kit

For your third step to outstanding performance, purchase the kit to convert the TA-32 to a TA-33. This includes a director element, seven foot boom, boom splice and all necessary hardware.

Amateur Net *$30.25*

3 MODEL TA-33



This is model TA-33 MOSLEY TRAPMASTER famous world wide for mechanical construction quality and performance. *(for 10, 15 and 20 meter bands)*

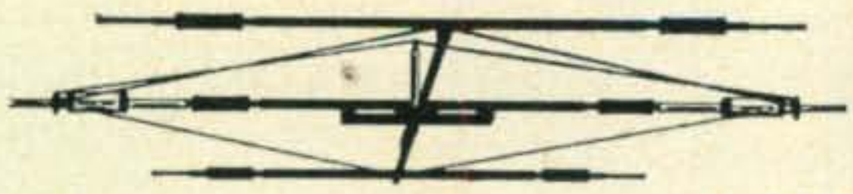
Amateur Net *$99.75*

+ Mosley TA-40K Conversion Kit

Finally, you can add 40 meters to your TA-33 without affecting the characteristics of the TA-33. Kit contains all necessary hardware. WITH THE 11-YEAR SUN-SPOT CYCLE in effect, 40 meter operation becomes more important than ever.

Amateur Net *$39.95*

4 MODEL TA-3340



NEW!

MOSLEY TA 3340 TRAPMASTER is now available as a complete package ready to install. Package contains TA-33 and TA-40K complete with all parts and hardware.

Amateur Net *$139.70*

ALL MOSLEY ANTENNAS CONSTRUCTED OF:

- *6061T6 Heavy Gauge Aluminum!*
- *100% Rust/Corrosion Proof!*
- *High Grade S. Steel Hardware!*

NOTE: A Model AK-60 Mast Plate Adapter for 2" OD Mast is available. Complete with aluminum angle and hardware.

Amateur Net . . . . *$ 4.78*

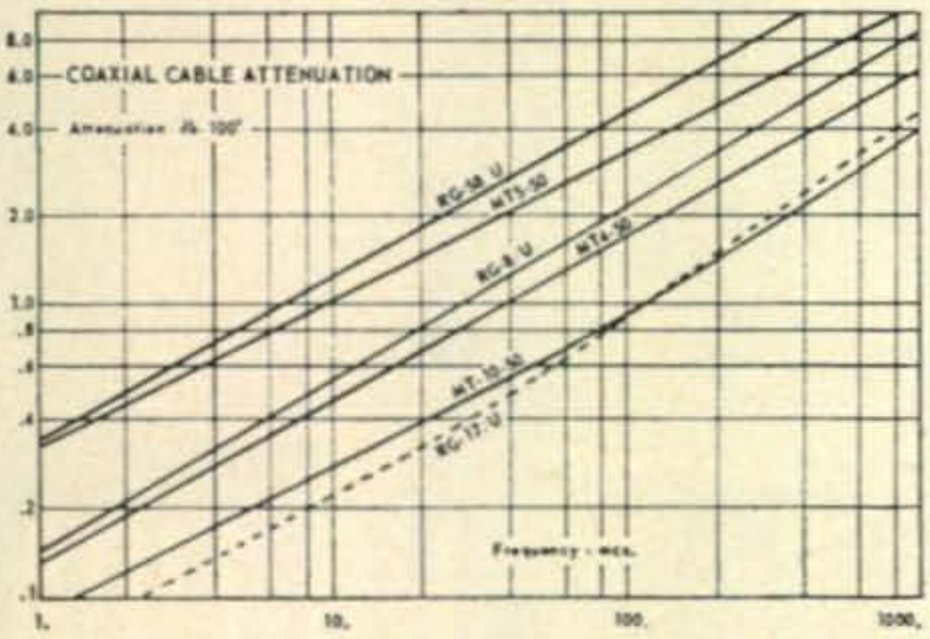
SEE YOUR DEALER TODAY
OR WRITE

Mosley Electronics Inc.
4610 N. LINDBERGH BLVD. - BRIDGETON, MISSOURI

For further information, check number 6, on page 126

Power Lost in Coax is Gone Forever!

See article by Michael Ferber in April, 1959, Q.S.T.



Reduce This line loss with

Mosley Lo/Ten Coaxial Cable

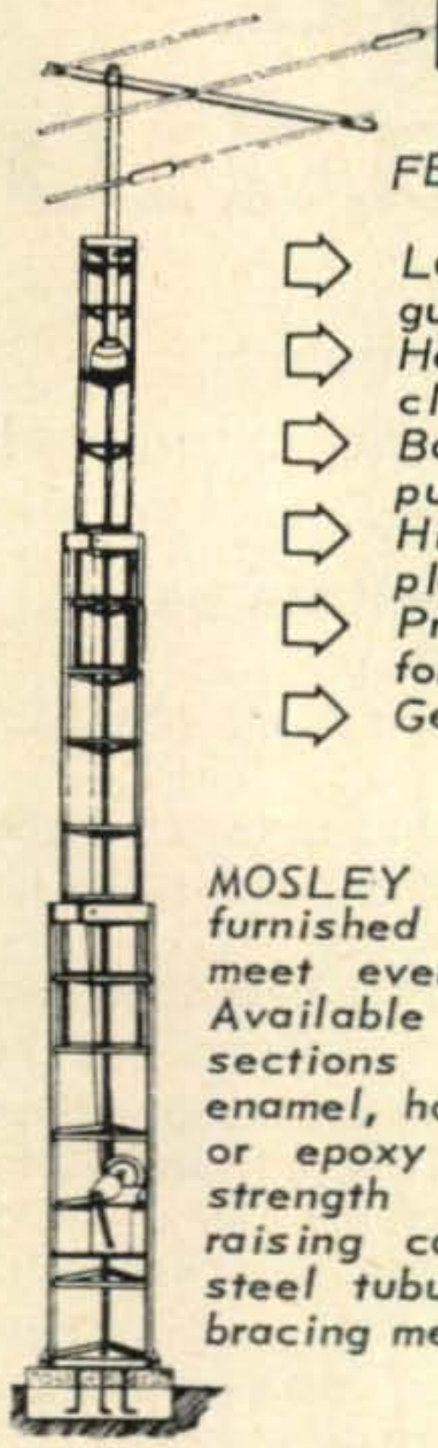
- Light Weight!
- Higher Tensile Strength!
- 30% Lower Attenuation!
- 20-Year Life Expectancy!
- Suitable For Direct Burial!

Mosley Type	Similar To
MT 4-50	RG- 8/U
MT 5-50	RG-58/U
MT10-50	RG-17/U

Lo/Ten is manufactured for Mosley by *Times Wire and Cable Company*, Division of International Silver Company, and is familiar to coaxial cable users as T-Line. Lo/Ten is distributed by Mosley through exclusive arrangement with *Times Wire and Cable Company*.

NEW! COMPLETE LINE OF MOSLEY TOWERMASTERS

see and hear



FEATURES:

- Low friction section guides!
- Heavy steel safety clips!
- Ball bearing metal pulleys!
- Hinged steel base plate!
- Pre-drilled rotor plates for mast!
- Geared raising winches!

MOSLEY TOWERMASTERS are furnished in many designs to meet every ham requirement. Available in 10 and 20 foot sections with triple coated enamel, hot dipped galvanized, or epoxy resin finish. Extra strength galvanized aircraft raising cables, high strength steel tubular leg and channel bracing members.

THE Mosley CM-1

receiver is the first low priced receiver with double conversion and crystal controlled first oscillator. It is also the first receiver with 5 dual-purpose tubes of one type and 4 semi-conductor diodes which perform all functions usually requiring 12 or more tube sections. See this really new design concept in amateur receivers now on display at your dealer.

CM-1 Receiver . . . . . Amateur Net $ 182.70
CMS-1 Speaker . . . . . Amateur Nét $ 16.95

ASK YOUR DEALER FOR FULL SPECIFICATIONS

Mosley

OR WRITE

Electronics Inc.

4610 N. LINDBERGH BLVD. - BRIDGETON, MISSOURI

For further information, check number 11, on page 126

A New Dimension in Amateur Radio

The Hammarlund HQ-110A looks like the 110—but basic design changes create the subtle difference between excellent and exquisite! A joyful performer as the HQ-110, the new HQ-110A reaches new heights of operating pleasure by including such extras as:

"Personal Touch" Electronic Keyer—HK-1B

Twice the value—half the cost. The all-transistorized HK-1B is comparable feature-for-feature with keyers costing **twice as much.** Adjustable "personal Touch" ratio for dots/dashes. Suitable for automatic, semi-automatic (bug) or straight key operation.

only **$39.95**
(less battery)

- Significantly tighter mechanical and electrical stability
- Accessory socket for pre-amp or converter application
- Expanded dial—with 144-148 MC calibrations for use with 2 meter converters
- Separate 6 meter coax input for rapid shift from VHF to LF operation

This 12 tube, dual-conversion superheterodyne receiver covers all amateur bands, from 160 to 6 meters—with optimum reception of CW and SSB signals through a separate linear detector.

You have to try this receiver to see just how good it really is—but if you can't—send for the new, informative brochure on the HQ-110A—or pick one up at your local Hammarlund distributor.

Still only
$249.00

24 hour clock timer $10 optional

For further information, check number 8, on page 126

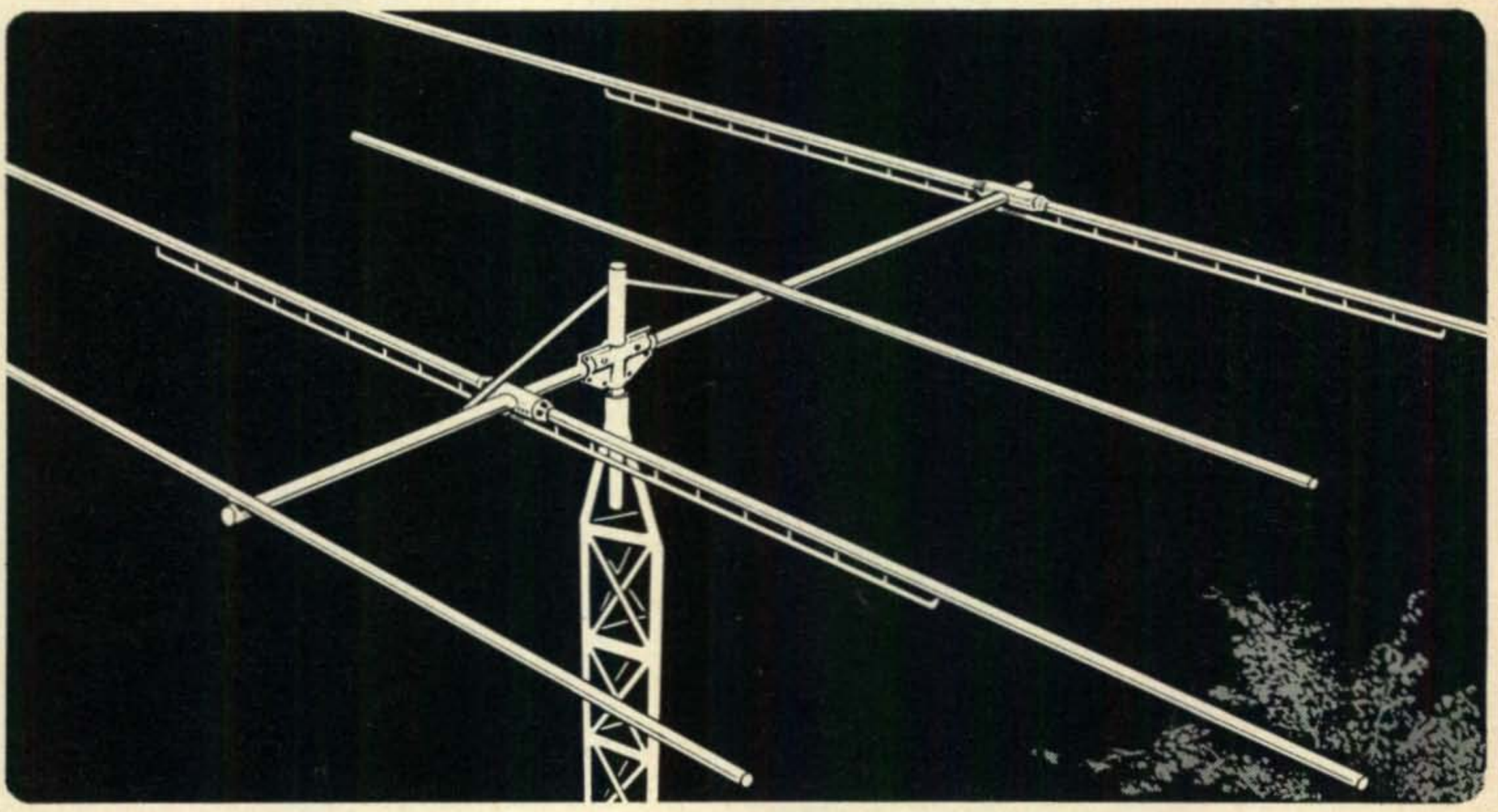
Established 1910

HAMMARLUND
MANUFACTURING COMPANY, INC.
A Giannini Scientific Company
53 West 23rd Street, New York 10, N.Y.

NEW hy·gain

DUOBANDER

for the popular 20-40 meter bands



New compact lightweight unit features Linear Decoupling Stub and Beta Match

The 20-meter and 40-meter bands are becoming more and more popular with amateurs because of more room for expansion and low sun spot activity. That's why the Hy-Gain engineering staff has designed this important new antenna. The Hy-Gain Duo-bander has three full-sized elements on 20 meters and two reduced-size elements on 40 meters. It's compact, lightweight, highly practical—and priced right.

Through the exclusive Hy-Gain development, the linear decoupling stub, the ordinarily outsize 40-meter element is reduced to about ⅔ of the normal size. This makes the Hy-Gain antenna practical, usable where others won't work out, but keeps performance standards high.

The exclusive Hy-Gain advancement of the linear decoupling stub makes two-band operation possible. You do away with inductance and capacity traps, yet the Duobander elements sections can be decoupled very efficiently. The linear loading principle, another Hy-Gain exclusive, does far better than a loading coil in reducing antenna size.

A proven Hy-Gain development—THE BETA MATCH makes possible maximum gain and low standing wave ratio into a single 52 ohm coaxial feed line. For perfect pattern symmetry, a broad band balun is an integral part of the matching system.

SPECIFICATIONS

ELECTRICAL

Forward Gain over a tuned dipole 20 meters	8.1 DB
Forward Gain over a tuned dipole 40 meters	4.9 DB
Front to back ratio 20 meters	20-30 DB
Front to back ratio 40 meters	15-20 DB
VSWR at resonance (typical)	1.2:1
Nominal impedance	50 ohms
Power Capability	5 KW P.E.P., 3 KW AM

MECHANICAL

Net Weight	54 lbs.
Boom Length	24 ft.
Element Length	Approx. 40 ft.
All aluminum construction—Alloy 6063T832—Tensile strength 45,000 PSI	
All hardware iridite-treated to military specifications, all plastic high impact Cycolac	
Wind surface area	6.9 sq. ft.
Turning Radius	24.2 ft.

price $169.50

See your local Hy-Gain dealer or write for Duobander Bulletin.

hy·gain antenna products

8405 NE HIGHWAY 6, LINCOLN, NEBRASKA

For further information, check number 9, on page 126

Designed for

M

Application

The No. 90901
One Inch
Instrumentation Oscilloscope

Miniaturized, packaged panel mounting cathode ray oscilloscope designed for use in instrumentation in place of the conventional "pointer type" moving coil meters uses the 1" 1CP1 tube. Panel bezel matches in size and type the standard 2" square meters. Magnitude, phase displacement, wave shape, etc. are constantly visible on scope screen.

JAMES MILLEN
MFG. CO., INC.

MAIN OFFICE AND FACTORY
MALDEN
MASSACHUSETTS

M

Letters..... to the Editor

USA-CA

Editor, *CQ*:

Having recently received my U.S.A. Counties Award Certificate I feel I should write you a few lines to let you know what a wonderful job you have done in producing such a masterpiece. I feel that it is some compensation for the considerable number of hours I spent in compiling the details to enable me to qualify.

I feel that those amateurs interested in obtaining awards from all over the world owe a considerable debt both to Clif, K6BX, and *CQ* for doing so much to assist them.

Should this letter be printed I should be glad if you would give publicity to the fact that I QSL 100 per-cent and if any ham I have contacted has not received my card he should check with his QSL Bureau and if no luck there advise me by letter and I will see he gets one.

Once again my sincere thanks for your help in producing that Certificate and please express to Helen, W1HOY my congratulations for obtaining hers with all contacts on 50 mc phone—an amazing effort.

Mark H. Churton, ZL1TB
2 Maungawhau Road
Epsom, Auckland, New Zealand

Editor, *CQ*:

. . . A word of praise and thanks. I'm most pleased to have the USA-CA award on the wall. A truly beautiful piece of art-work and printing that any ham would love to have in his shack! Glad that I did stay after those QSLs until I had enough for the award . . .

Don Mullen, KØHUU
1510 W. Hamilton
Springfield, Missouri

Editor, *CQ*:

. . . Just a "quickie" to say that I received the Counties Certificate and that it is just out of this world. Well worth working and waiting for. For me —I do have a little difficulty with it; so far I've kept all of my certificates in plastic folders and in a three ring notebook. Just don't see how I'll be able to do that with the Counties Certificate; guess that this is one that I'll frame . . .

Helen Harris, W1HOY
Medfield, Massachusetts

Editor, *CQ*:

. . . "Mucho gracias" for the USA-CA-500 Certificate. There's really only one word that can describe it, namely "WOW." Clif wasn't kidding when he said it would be the largest and most beautiful certificate in the world—sure is!!

Stan Frederickson, W2FLD
322 Harvard Road
Garden City South, L.I., N.Y.

Editor, *CQ*:

Mni tnx for USA-500. It is one beautiful award and I am very pleased to possess it.

Louis Fenn, F9BB
84 rue du 22 Septembre
Courbevoie, Seine, France

Editor, *CQ*:

Am thrilled to pieces with my USA-CA certificate. It is the Daddy of them all.

Marge Campbell, K4RNS
24 Palmetto Dr.
Ormond Beach, Fla.

For further information, check number 10, on page 126

your choice of 2 GREAT EICO® TRANSMITTERS...

designed by Hams... for Hams...

to the highest Ham standards

90-WATT CW TRANSMITTER* #720
Kit **$79.95** Wired **$119.95**
*U.S. Pat. #D-184,776
"Top quality"—ELECTRONIC KITS GUIDE
Ideal for veteran or novice. "Clean" 90W CW, 65W AM-phone with EXT plate modulation. 80 through 10 meters.

60-WATT CW TRANSMITTER #723
Kit **$49.95** Wired **$79.95**
"Compact; well-planned lay-out. Clean-sounding, absolutely hum-free carrier; stable." — ELECTRONICS WORLD.
Perfect for novice or advanced ham needing low-power standby rig. "Clean" 60W CW, 50W AM-phone with EXT plate modulation. 80 through 10 meters.

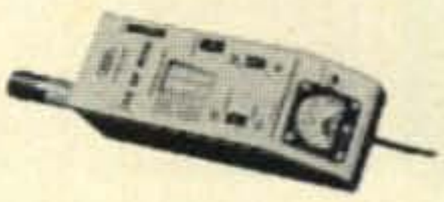
TRANSISTOR CODE PRACTICE OSCILLATOR #706
Complete with battery Select variable tone, flashing light, or both together. Phone jack for private use. Efficient speaker: clean loud signals.
Kit **$8.95** Wired **$12.95**

New! **CITIZENS BAND WALKIE-TALKIE #740**
Complete with rechargeable battery and charger. 9 transistors, 1 diode. Full superhet. U.S. made.
Kit **$54.95**
Wired **$79.95**

CITIZENS BAND TRANSCEIVERS
770 Series
Superhet; pre-aligned xmitter osc; match antennas by variable "pi" network. Single & multi-channel models.
From Kit **$79.95** Wired **$109.95**

U. S. Pat. #D-190,970

HIGH-LEVEL UNIVERSAL MODULATOR-DRIVER #730
Kit **$49.95** Wired **$79.95**
Delivers 50W undistorted audio for phone operation. Can plate-modulate transmitters having RF inputs up to 100W. Unique over-modulation indicator. Cover E-5 $4.50.



GRID DIP METER #710
Kit **$29.95** Wired **$49.95**
Includes complete set of coils for full band coverage. Continuous coverage 400 kc to 250 mc. 500 ua meter.

PEAK-TO-PEAK VTVM #232
& exclusive
***UNI-PROBE®**
Kit **$29.95**
Wired **$49.95**
VACUUM TUBE VOLTMETER #221
Kit **$25.95** Wired **$39.95**

*U. S. Pat. No. 2,790,051

DC-5MC LAB & TV 5" OSCILLOSCOPE #460
Kit **$79.95**
Wired **$129.50**
5" GENERAL PURPOSE SCOPE #427
Kit **$69.95** Wired **$109.95**

DYNAMIC CONDUCTANCE TUBE & TRANSISTOR TESTER #666
Kit **$69.95** Wired **$109.95**
TUBE TESTER #625
Kit **$34.95** Wired **$49.95**

RF SIGNAL GENERATOR #324
(150kc-435mc)
Kit **$26.95**
Wired **$39.95**
TV-FM SWEEP GENERATOR & MARKER #368
Kit **$69.95** Wired **$119.95**

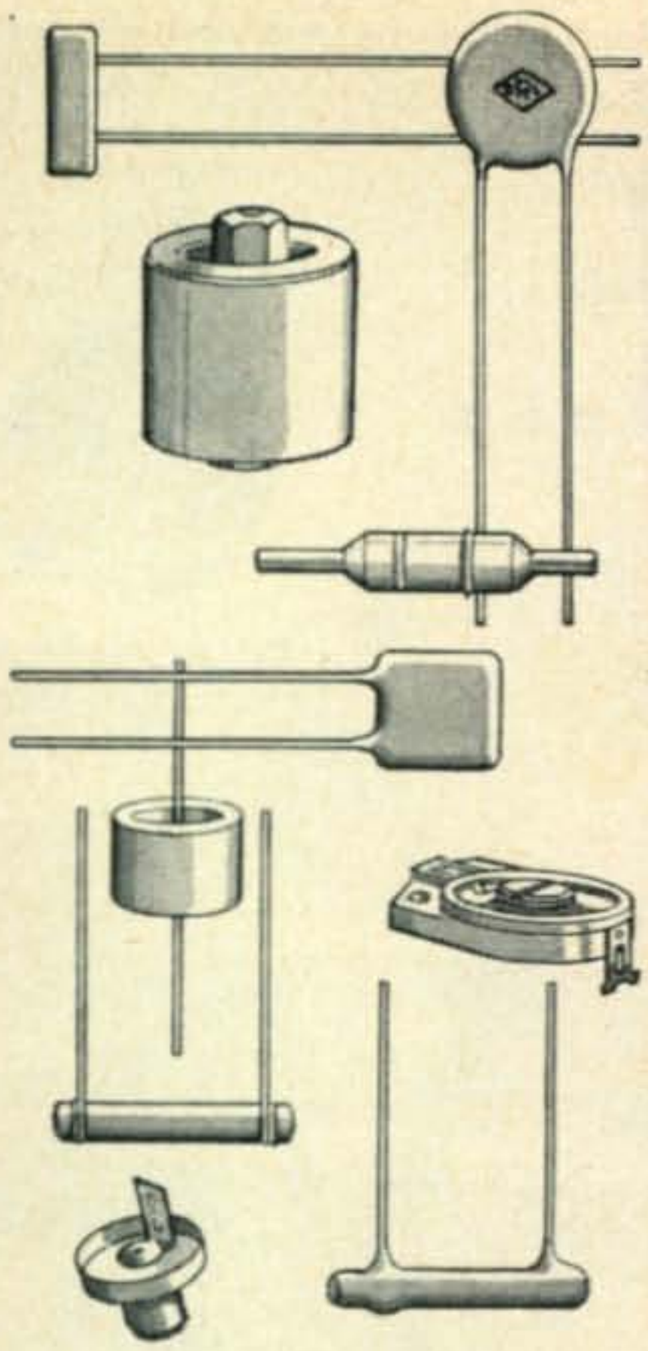
EICO®
ELECTRONIC INSTRUMENT CO., INC.
3300 NO. BLVD., L.I.C. 1, N. Y.
Export Dept., Roburn Agencies, Inc.
431 Greenwich St., N. Y. 13, N. Y.

EICO, 3300 N. Blvd., L.I.C. 1, N. Y. CQ-8
☐ Send free Catalog & name of neighborhood distributor.
☐ Send free "Short Course for Novice License." ☐ Send 36-page **STEREO HI-FI GUIDE:** 25c enclosed for postage & handling.

Name.....
Address.....
City..... Zone..... State.....
Add 5% in the West.

ENGINEERS: Excellent career opportunities in creative electronics design. Write to the Chief Engineer.

For further information, check number 7, on page 126



If you need a

Ceramic Capacitor

Centralab

has it!

As the pioneer in the development and production of ceramic capacitors, Centralab has the industry's most complete line... and is your best source for ceramic transmitting capacitors!

No matter what your requirements—discs, tubulars, buffers, trimmers, feed-thrus, high voltage, low voltage—Centralab makes them, and makes them best.

Whether you need one capacitor or one thousand, your nearby Centralab distributor can supply them—probably right from his complete stocks.

For the complete list of stock capacitors, ask your distributor for Catalog 31, or write for your free copy. D-6136

Centralab

THE ELECTRONICS DIVISION OF GLOBE-UNION INC.
954H EAST KEEFE AVENUE · MILWAUKEE 1, WISCONSIN
In Canada: Centralab Canada Ltd.,
P.O. Box 400, Ajax, Ontario

Short Wave Listeners

Editor, *CQ*:

I would like to offer my congratulations to *CQ* for the fine words about s.w.l.'s in the May, USA-CA column. K6BX has long been a friend of the s.w.l. and I would like to thank him for having included us in so many of the awards featured in his column.

I and most of my s.w.l. friends are in complete sympathy with amateurs on such problems as frequency allocation, reciprocal licensing, etc. Why then does the ham turn his back on us? A great many of us are prospective hams but for various reasons it is not possible for us to get our ham tickets at this time. *CQ* and many individual hams recognize the s.w.l. as a person with a mutual interest. The ARRL, on the other hand, has tried to pretend that the s.w.l. does no exist. If the ARRL would follow the lead of these individual hams and let the s.w.l. into the fold, I am sure that both the ARRL and the s.w.l. would benefit greatly.

Clifford Hoobler
8134 Baird Avenue
Reseda, Calif.

Editor, *CQ*:

I have just finished reading the USA-CA column in your May issue of *CQ* and felt that I had to write a letter of congratulations and sincere thanks for having presented the viewpoint of the s.w.l. in the clearest light that I have ever read. I am a veteran s.w.l.er with over 10 years of listening in the log book and so believe that I am in a position to speak intelligently. It is really a shame that something hasn't been done before now to *really* acquaint the amateur fraternity with the true facts. I am not an amateur operator by choice, however, I feel that I know as much electronics theory as most amateurs. I don't bother hams with incomplete reports; in fact I only report to DX stations and then only those that are in countries that I haven't verified. I did, however, confirm all 50 states during a three month period beginning, December 1961. I submitted factual reports, always enclosed return postage and envelope and tried to be honest in reporting such things as over modulation, hum, key clicks, chirps, etc. For my efforts I got a 98% return on all my reports. There were a few old grouches that hinted that I didn't know anything about transmitters because I was only a s.w.l. but these were far in the minority.

I am a member of a progressive club, the American Shortwave Listeners Club, that is doing its share to acquaint new s.w.l.ers with proper reporting procedure, etc. I feel that being a s.w.l. is like serving an apprenticeship for ham licensing. Then again there are many of us who listen to shortwave broadcast stations only. In any case, most of us support amateur radio instinctively.

Thanks also for having open the USA-CA to s.w.l.s. I feel that you have really shown the way for others to follow in giving awards to s.w.l. as well as hams.

T/Sgt William R. Gardner, WPE2DLX/5
511C Field Training Detachment
Walker Air Force Base, New Mexico

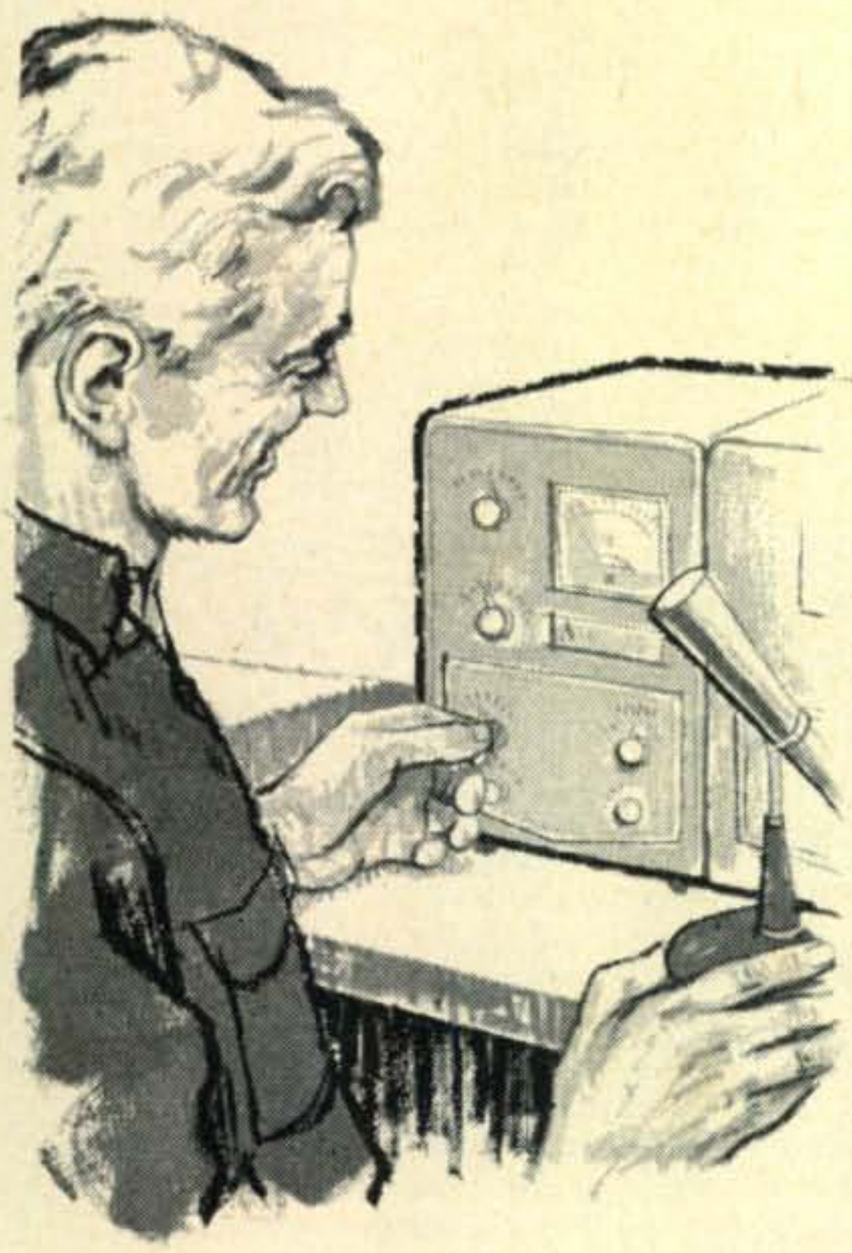
Editor, *CQ*:

Just enjoyed an excellent evening meal and topped it off with Clif's wonderful article in the May, 1962 issue of *CQ* "County Cousin Outcasts—S.W.L.s" a real dessert treat and he is not only to be congratulated on his broad viewpoint, courage and downright "guts" to come out in the open as he has, but he deserves also the heartfelt thanks of those of us on "this side of the fence." I know you will receive many, many letters of appreciation.

I agree that the s.w.l. is definitely on the side of the amateur and, if given the opportunity, will prove this to hamdom. We admire the members of amateur radio for their knowledge of their hobby which enabled them to meet the requirements to get their licenses. We envy them their ability to talk to each other over the miles while we have to sit back and listen. Many s.w.l.s do become hams in time. I know that I have learned much about amateur radio by ear. The bug has bitten me and I frankly must admit that I would like to go farther and get my ticket—

For further information, check number 12, on page 126

New! "SSB Adapter"



SCHEDULED FOR FALL DELIVERY

NEW! COMPLETE FILTER-TYPE SSB ADAPTER!

● Bandswitching 80 through 10 meters
. . . more than 50 db sideband suppression
. . . more than 45 db carrier suppression!

Here's the filter-type SSB generator that amateur operators everywhere have been asking for! The "SSB Adapter" when used with the Viking "Valiant" or "Valiant II" places 275 watts P.E.P. at your command—gives you the punch and penetration necessary for solid communications on today's crowded bands!

The Viking "SSB Adapter" consists of two compact units and interconnecting cables. RF unit is only 8" wide—may be placed on your operating desk alongside your "Valiant"—power supply unit may be placed in any convenient location. Unique design features built-in multiplier requiring VFO input only—band-pass interstage couplers require no tuning—design and front panel layout make the "SSB Adapter" practically "foolproof" in operation! Unit gives superb audio fidelity and balanced audio response; excellent sideband, spurious and carrier suppression. 7360 beam deflection balanced modulators and specially developed multisection crystal filter give you more than 50 db sideband supression —more than 45 db carrier suppression. Other features: Instant bandswitching coverage 80 through 10 meters; smooth, positive VOX and anti-trip circuits with built-in anti-trip matching transformer and adjustable VOX time delay.

SPECIFICATIONS

FREQUENCY RANGE:
80, 40, 20, 15, and 10 meters.

POWER REQUIREMENTS:
Separate plug-in unit supplies filament, bias, plate voltages. 90 watts; 105-125 V AC, 50-60 cycles. Single Phase.

POWER OUTPUT:
Approximately 2 watts. Will drive "Valiant" or Valiant II" to full SSB input.

SUPPRESSION:
Unwanted Sideband:
50 db or better

Carrier Suppression:
45 db or better

Spurious Frequencies:
50 db or better

Distortion Products:
Better than 40 db down

FUSE PROTECTION:
1½ Amp, 110 V AC fuse is chassis mounted on power supply.

Cat. No. 240-305-2 Viking "SSB Adapter" wired and tested with remote power supply, tubes crystal filter, less microphone.

AMATEUR NET $369.50

New Catalog

E. F. Johnson also manufactures a line of higher power transmitters; SSB equipment; amplifiers; station accessories; keys and practice sets . . . all described in detail in our newest amateur catalog. Write for your copy today!

E. F. JOHNSON COMPANY
WASECA, MINNESOTA, U.S.A.
®

FACTORY AUTHORIZED SERVICE Instead of shipping to our factory, equipment to be serviced may also be sent to:

Electrosony Corp.—Empire State Div.
65-37 Queens Blvd.
Woodside 77, New York

Park-Armature Co.
1218 Columbus Ave.
Boston 20, Mass.

Heights Electronics, Inc.
1145 Halsted Street
Chicago Heights, Ill.

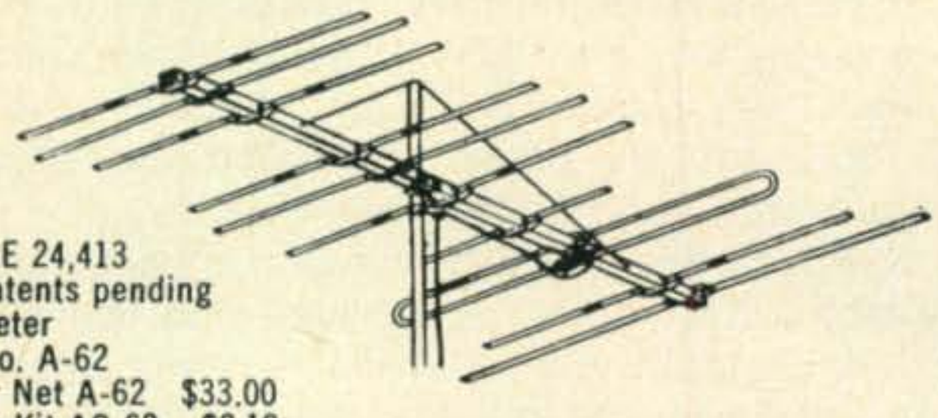
B and S Electronics, Inc.
6326 W. Roosevelt Rd.
Oak Park, Ill.

Radio Comm and Engr.
Pinehurst Place
Charlotte 9, N. C.

For further information, check number 13, on page 126

NOW!
TWO ANTENNAS IN ONE*

*another *FIRST* from *FINCO*



Patent RE 24,413
Other patents pending
6 & 2 Meter
Model No. A-62
Amateur Net A-62 $33.00
Stacking Kit AS-62 $2.19

The Only Single Feed Line

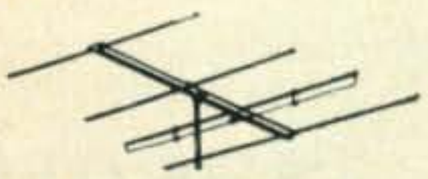
6 & 2 METER COMBINATION YAGI ANTENNA

from **FINCO**

- Heavy Duty Square Aluminum Boom, 10 Ft. Long
- All Elements are Sleeve Reinforced And Completely Pre-assembled With "Snap-Out" Lock-Tite Brackets
- Boom Suspension Rods Are Supplied Completely Pre-assembled, Ready To Be Snapped Into Upper End Of Mast

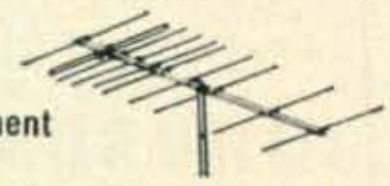
ON 2 METERS:
18 Elements
1—Folded Dipole Plus Special Phasing Stub
1—3 Element Collinear Reflector
4—3 Element Collinear Directors

ON 6 METERS:
Full 4 Elements
1—Folded Dipole
1—Reflector
2—Directors



A6-4 6 Meter 4 Element
Amateur Net $17.16
Stacking Kit AS-6 $2.19

A2-10 2 Meter 10 Element
Amateur Net $11.88
Stacking Kit AS-2 $1.83



A1¼-10 1¼ Meter 10 Element
Amateur Net $11.88
Stacking Kit AS-1¼ $1.26

See Your *FINCO* Distributor
or write for Catalog 20-226 to:
THE FINNEY COMPANY
Dept. 19, 34 W. Interstate St., Bedford, Ohio

For further information, check number 14, on page 126

as so many hams make note of on their QSL cards to me. I suppose many of our present day amateurs had to do the same thing—but at 55 years of age? I wonder.

I hope sincerely that hamdom reads the May issue over and over and absorbs the meat that is in it. We want to be good friends. We want to take part in the hobby and many of us will. In the meantime don't shut the door in our faces as a great many do.

I just received a reply to an s.w.l. card. It states "I do not like s.w.l. cards so I don't QSL them." I would have felt a great deal better had the writer ignored my report entirely.

But I guess that's what makes the world go round and I'm still glad to be a small part of it all.

Thanks you sincerely for your fine article. I, for one, am deeply gratified.

S. J. Knox, WPE2HEA
212 No. Jerome Avenue
Margate City, N.J.

Alabama

The North Alabama Hamfest Association is making Sunday, August 19th their Hamfest and Space Electronics Exhibit day. Big Spring Park is the place. Jack Nelson, W4NFK will fiill you in; he's at Box 423 in Huntsville.

Virginia

The Shenandoah Valley Amateur Radio Club, Inc. will hold its annual shindig on August 4 and 5. Banquet and Dance will be held Saturday evening at the Lee Jackson Ballroom in Winchester, Va., and the usual equipment display, swapfest, auction, etc. will be held Sunday at the Armory, beginning at 10 A.M. Plenty of prizes, games, etc. is expected. For complete details write the Shenondoah Valley A.R.C., Box 139, Winchester, Virginia.

ATTENTION

AS FAR as we can ascertain, radio amateurs in the Soviet Union are the only group that can, in *no way*, exchange their money for American dollars, and because of this, lose out each month in their ability to receive *CQ*. Soviet amateurs are extremely interested in receiving American publications and *CQ*, with the help of the International Ham-Hop Club, is instituting a method, whereby American amateurs can offer subscriptions to Russian radio amateurs at a considerable reduction over the normal rate.

Interested amateurs should write R. L. Gunther, W6THN/1, the North American representative of the I.H.H.C. enclosing their check or money order for $8.00 in payment for two one-year subscriptions for *two individual* amateurs or $8.00 for one two-year subscription for a *single* radio amateur. Please *do not* write *CQ!*

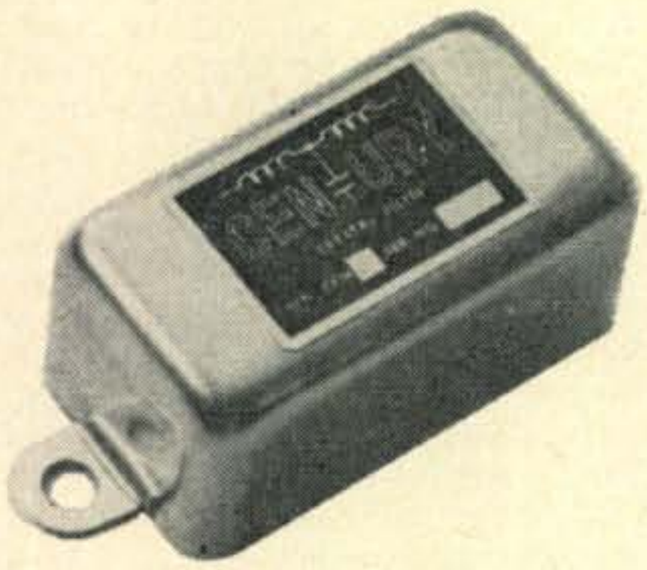
You may, or may not specify the recipient. In either case, gift cards and envelopes, together with name and address of the Russian radio amateurs will be sent to the donor.

The North American Division of the I.H.H.C. is handling the paper-work without remuneration.

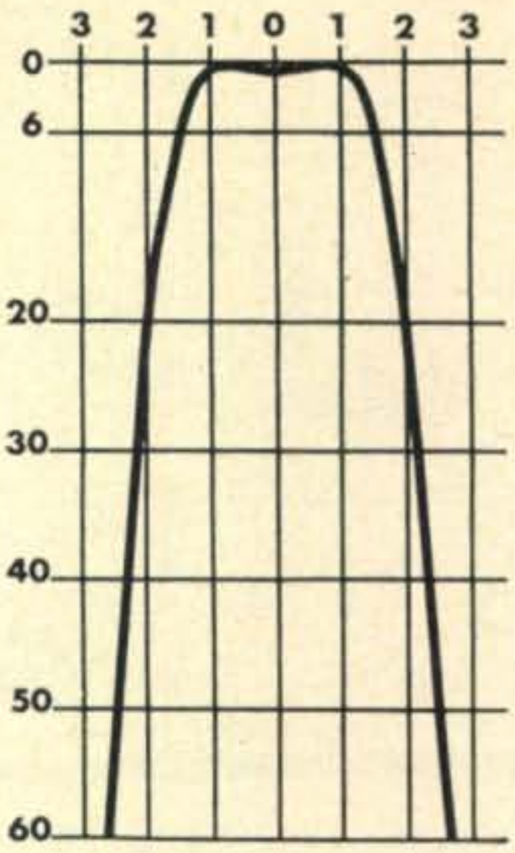
We hope you feel, as we do, that American publications are sorely needed in the U.S.S.R. and this is our way of tightening the bonds of amateur friendship. We hope it is successful! Lee's address is:

R. L. GUNTHER, W6THN/1
c/o Biology Department
Brown University
Providence 12, Rhode Island

SSB FILTER



CF14S CRYSTAL FILTER



Center frequency: 455KC.
Passband: 3KC at 6 DB; 5.5KC at 60DB.
Shape factor: 1.8:1
Sideband rejection: 50 DB.
Carrier suppression: 20DB.
Passband ripple: ± 1/2DB.
Input impedance: 560 OHMS, and 33K.
Output impedance: 33K.
Mech. size: 1 13/16 x 1 x 7/8.

- Lowest priced SSB filter on the market.
- Only SSB filter on the market with five year guarantee.
- Uses high quality gold plated MIL Spec. crystals.

GUARANTEED

Guaranteed for five years against electrical and mechanical failure under reasonable environmental conditions.

Price $18.95

PRICE INCLUDES FILTER, FT241 UPPER AND LOWERSIDEBAND CRYSTALS, APPLICATION DATA, AND RECOMMENDED CIRCUITS.

TO ORDER
Send check or money order to .....
We require 25% down on C.O.D.
Californians add 4% state sales tax.

CENTURY COMMUNICATIONS CORP.
P.O. BOX 445
WESTMINSTER, CALIFORNIA

Application data and recommended circuits sent on request.

CENTURY

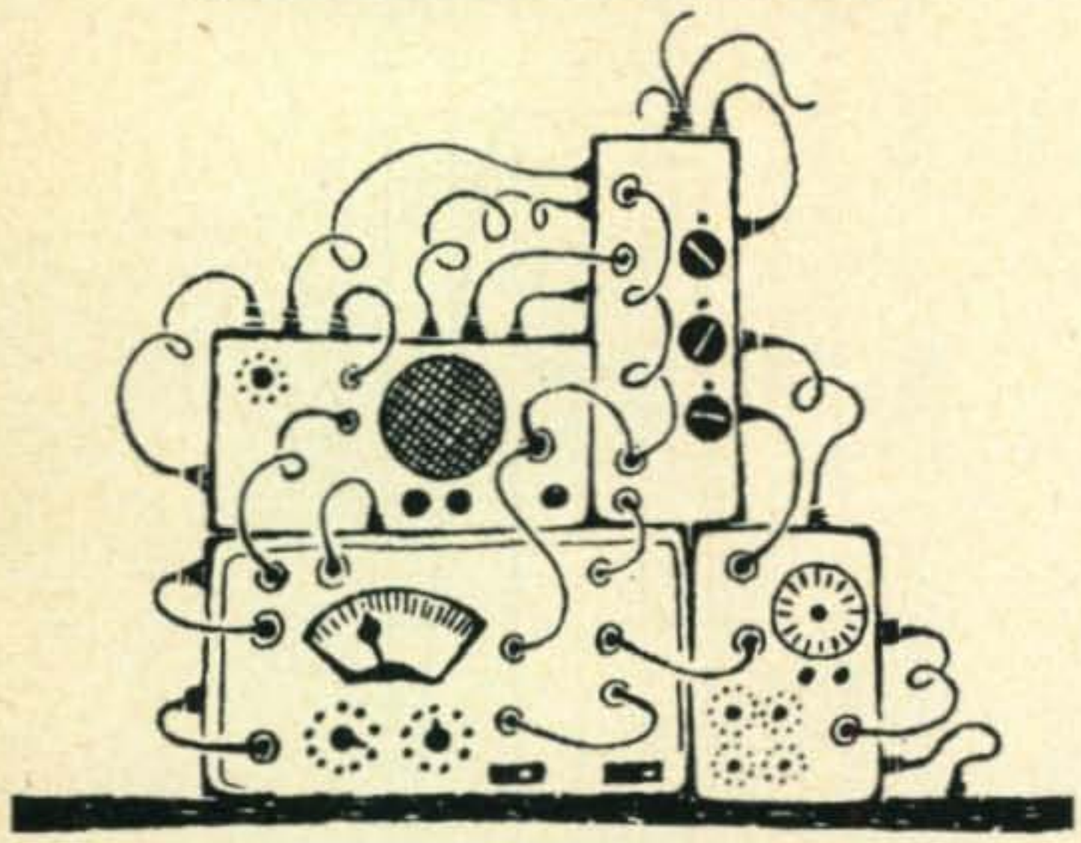
CENTURY COMMUNICATIONS CORP.

P.O. BOX 445, WESTMINSTER, CALIFORNIA

For further information, check number 25, on page 126

WATERS UNNETTLES RIGS

COAXIAL SWITCHES

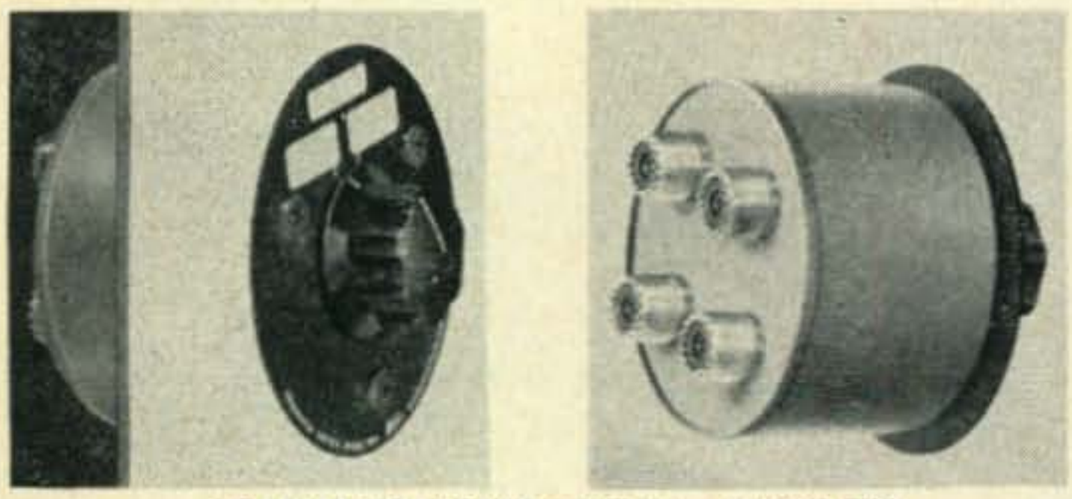


SWITCH IN, SWITCH OUT, OR DO THE 6-WAY SWITCH IF YOU'RE A HAM WHAT AM WITH A WATERS COAXIAL SWITCH.

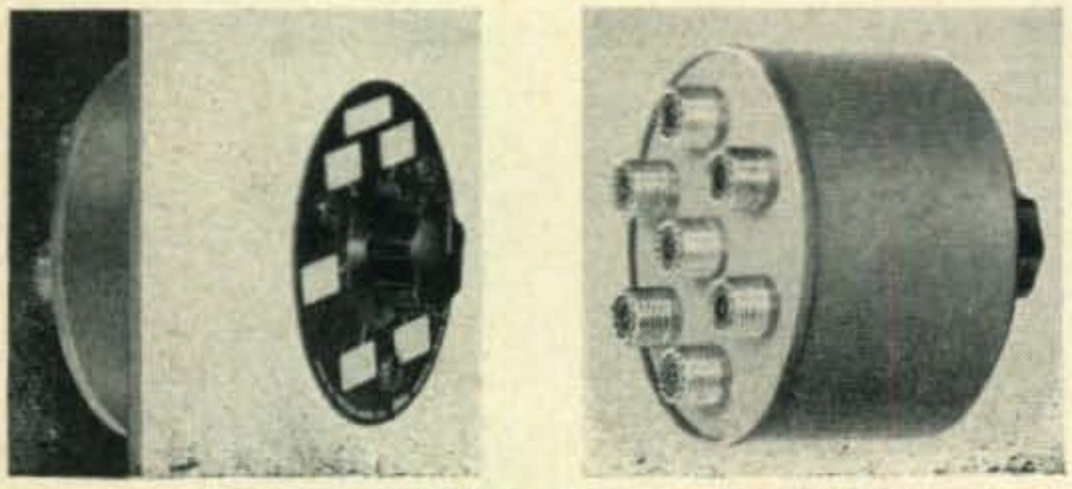
Designed for panel mounting, and featuring in-line orientation of the coaxial connectors, these compact units occupy a minimum amount of space with ready access for connecting and disconnecting. The Waters Coaxial Switches have a negligible insertion loss, low standing-wave ratios (less than 1.1 up to 150 mc.), and a power carrying capacity of 1 kw. They come in two models complete with mounting screws, knob, and escutcheon plate with provision for erasable markings.

COAXIAL TRANSFER SWITCH — MODEL 336. A double-pole, double-throw (internally strapped) unit for in-and-out switching of a Power Amplifier between an exciter and antenna. Connections are made to 4 standard SO-239 UHF connectors. Amateur Net: $11.45

COAXIAL SELECTOR SWITCH — MODEL 335. A single-pole, 6-position switch used for selection of RF sources, antennas, etc. Connections are made to 7 standard SO-239 UHF connectors. Amateur Net: $12.95 . . . . . Available at leading distributors



COAXIAL TRANSFER SWITCH — MODEL 336



COAXIAL SELECTOR SWITCH — MODEL 335

WATERS MANUFACTURING, INC.
WAYLAND, MASSACHUSETTS

For further information, check number 15, on page 126

Texas

The West Gulf Division ARRL Convention will be held on August 3, 4, and 5 in the Robert Driscoll Hotel in Corpus Christi. Hosts of this three day show will be the Corpus Christi Amateur Radio Club. Registration is $10.00 and entitles the ticket holder to all general functions. Grand prize will be an SX-115. The turn-out is expected to break records, so make your reservations early. The Club can be reached at Box 2073, Corpus Christi, Texas.

The seventh annual hamfest, sponsored by the Central Texas Amateur Radio Club will be held on the mall of the Lake Air Shopping Center, Waco, Texas, Sunday, September 2nd. The club call is W5ZDN and they are at Box 1032, Waco.

Pennsylvania

The silver Anniversary hamfest of the South Hills Brass Pounders & Modulators, Inc. will be held on Aug. 12, at the Museum Building at the South Park Fairgrounds in Pittsburgh. Swap and shop, manufacturers' displays, snacks, refreshments and prizes galore are on the agenda. Registration starts at noon at $2.00, and $1.50 in advance. W3PIQ will be on 6 and 10 for mobilers. Pre-registration can be obtained from W3HND, 2283 Spokane Ave., Pittsburgh 10.

Illinois

Hamfesters Radio Club, Inc. will hold their 28th Annual Hamfest August 12, at the Sante Fe Park near Chicago. Tickets in advance are $1.00 and at the gate, $1.50. Write Larry Finnan, K9EEC, Picnic Chairman, at 1209 West 74th Street, Chicago 36, Ill. for further information.

New Mexico

The Amateur Radio Caravan Club of New Mexico. Albuquerque Chapter will hold its annual picnic and hamfest in the enclosed area of the Rio Grande Park on August 26. No fee, and everyone is invited to bring his own lunch. Soft drinks will be furnished. Rigs at the picnic will operate on 29.6 mc and 3993 kc. A number of interesting contests will also be held. K5KWU will give more dope. His address is 3813 Los Arboles N.E., Albuquerque, N.M.

You've probably heard about the International Ham-Hop Club, a world-wide organization promoting inexpensive travel via personal amateur contact. Left to right, Rex, G3MIK, who recently made a tour of the U.S.A. using I.H.H.C. facilities, chats with Lee Gunther, W6THN/1 the United States representative and John Alley, W1DMD, Hospitality Organizer for the club at John's Massachusetts QTH. If you're interested in visiting your fellow amateur (or being a host) drop Lee a card and he'll fill you in on an organization that already is representative in 50 countries! His QTH is c/o Biology Dept., Brown University, Providence 12, Rhode Island.

tells how

FREE

Completion of the Master Course (both Sections) will prepare you for a First Class Commercial Radio Telephone License with a Radar Endorsement. Should you fail to pass the FCC examination for this license after successfully completing the Master Course, you will receive a full refund of all tuition payments. This guarantee is valid for the entire period of your enrollment agreement.

Your FCC Commercial License —or your money back

"License and $25 raise due to Cleveland Institute training"

"I sat for and passed the FCC exam for my second class license. This meant a promotion to Senior Radio Technician with the Wyoming Highway Department, a $25 a month raise and a District of my own for all maintenance on the State's two-way communication system. I wish to sincerely thank you and the school for the wonderful radio knowledge you have passed on to me. I highly recommend the school to all acquaintances who might possibly be interested in radio. I am truly convinced I could never have passed the FCC exam without your wonderful help and consideration for anyone wishing to help themselves."

CHARLES C. ROBERSON, Cheyenne, Wyoming

Cleveland Institute Announces

A New And Dynamic

Technician Training Program in Computers, Servo Mechanisms, Magnetic Amplifiers, and Others

Other advanced fields covered include Basic Math, A. C. Circuit Analysis, Pulse Circuitry, Color TV, Radar, Advanced Measuring Techniques, Industrial Electronics, Instrumentation, Automation, Radio Telemetry. Send for information today.

GET THIS HANDY POCKET ELECTRONICS DATA GUIDE

FREE...

Puts all the commonly used conversion factors, formulas, tables and color codes at your fingertips. Yours absolutely free if you mail the coupon today. No further obligation!

TO GET THIS FREE GIFT, MAIL COUPON TODAY!

Cleveland Institute of Electronics
Desk CQ-91 1776 E. 17th St. Cleveland 14, Ohio

CIE HELPS TRAINEES GET BETTER JOBS

Get All 3 Booklets . . . Free

Cleveland Institute of Electronics
Desk CQ-91, 1776 E. 17th St., Cleveland 14, Ohio

Accredited by National Home Study Council.

Please send Free Career Information Material prepared to help me get ahead in Electronics. I have had training or experience in Electronics as indicated below.

- ☐ Military
- ☐ Radio-TV Servicing
- ☐ Manufacturing
- ☐ Telephone Company
- ☐ Amateur Radio
- ☐ Broadcasting
- ☐ Home Experimenting
- ☐ Other

In what kind of work are you now engaged?.....

.....

In what branch of Electronics are you interested?.....

.....

Name ..... Age.....

Address .....

City..... Zone..... State.....

CQ-9.

Send for NEW FREE CATALOG #962 with oscillator circuits

Citizen Band Class "D" Crystals

CITIZEN BAND CLASS "D" CRYSTALS

3rd overtone — .005% tolerance — to meet all FCC requirements. Hermetically sealed HC6/U holders. ½" pin spacing. .050 pins. (Add 15c per crystal for .093 pins). **$2.95 EACH**

All 23 channels frequencies in stock: 26.965, 26.975, 26.985, 27.005, 27.015, 27.025, 27.035, 27.055, 27.065, 27.075, 27.085, 27.105, 27.115, 27.125, 27.135, 27.155, 27.165, 27.175, 27.185, 27.205, 27.215, 27.225, 27.255.

Matched crystal sets for ALL CB units (Specify equipment make and model numbers) ..... **$5.90** per set

CRYSTALS IN HC6/U HOLDERS

SEALED OVERTONE	.486 pin spacing — .050 diameter — .005% tolerance	
	15 to 30 MC	**$3.85** ea.
	30 to 45 MC	**$4.10** ea.
	45 to 60 MC	**$4.50** ea.
FUNDAMENTAL FREQ. SEALED	From 1400 KC to 2000 KC .005% tolerance	**$5.00** ea.
	From 2000 KC to 10,000 KC, any frequency, .005% tolerance	**$3.50** ea.
RADIO CONTROL	Specify frequency. .05 pins spaced ½" (Add 15c for .093 pins).	**$2.95** ea.

QUARTZ CRYSTALS FOR EVERY SERVICE

All crystals made from Grade "A" imported quartz—ground and etched to exact frequencies. Unconditionally guaranteed! Supplied in:

FT-243 holders Pin spacing ½" Pin diameter .093	**MC-7 holders** Pin spacing ¾" Pin diameter .125
CRIA/AR holders Pin spacing ½" Pin diameter .125	**FT-171 holders** Pin spacing ¾" Banana pins

MADE TO ORDER CRYSTALS . . . Specify holder wanted

1001 KC to 1600 KC: .005% tolerance ..... **$4.50** ea.
1601 KC to 2500 KC: .005% tolerance ..... **$2.75** ea.
2501 KC to 9000 KC: .005% tolerance ..... **$2.50** ea.
9001 KC to 11,000 KC: .005% tolerance ..... **$3.00** ea.

Amateur, Novice, Technician Band Crystals

.01% Tolerance . . . **$1.50 ea.** — 80 meters (3701-3749 KC) 40 meters (7152-7198 KC), 15 meters (7034-7082 KC), 6 meters (8335-8650 KC) within 1 KC

FT-241 Lattice Crystals in all frequencies from 370 KC to 540 KC (oll except 455 KC and 500 KC) ..... **50c ea.**
Pin spacing ½" Pin diameter .093
Matched pairs _ 15 cycles **$2.50** per pair
200 KC Crystals, **$2.00 ea.**; 455 KC Crystals, **$1.25 ea.**; 500 KC Crystals, **$1.25 ea.**; 100 KC Frequency Standard Crystals in HC6/U holders **$4.50 ea.**; Socket for FT-243 Crystal **15c ea.**; Dual Socket for FT-243 Crystals, **15c ea.**; Sockets for MC-7 and FT-171 Crystals **25c ea.**; Ceramic Socket for HC6/U Crystals **20c ea.**

ENGINEERING SAMPLES and small quantities for prototypes now made at either Chicago or Fort Myers plants with 24 hour service. IN CHICAGO, PHONE GLadstone 3-3555

IF YOUR PARTS DEALER DOESN'T STOCK Texas Crystals, order direct and send us his name.

TERMS: All items subject to prior sale and change of price without notice. All crystal orders must be accompanied by check, money order or cash with payment in full.

RUSH YOUR ORDER NOW TO

TEXAS CRYSTALS

1000 Crystal Drive, Fort Myers, Florida

Dept. CQ-8 Phone WE 6-2100

FOR SHIPMENT VIA FIRST CLASS MAIL AT NO EXTRA COST ATTACH THIS ADVT. TO YOUR ORDER!

For further information, check number 16, on page 126

Two hundred and ten years of amateur radio! This quartet consists of W2YQ (1910), W2ZM (1910), W2BA (1908) and W2FG (1908). This snap was taken during a recent meeting of the New York Chapter of the QCWA.

Delaware

The combined efforts of the amateur radio clubs in Delaware makes possible their first Hamfest-Picnic on Sunday, August 12th. The Dover Air Force Base Recreational Area in Dover, Delaware will be the meeting place. George Rambo, W3LQE will give you more information; his QTH is 17 N. Avon Drive, Claymont, Delaware.

Indiana

Ecco Valley, on the Vanderburgh-Posey county line, Indiana Route 66, west of Evansville, Indiana will be the stomping ground for the Tri-State Amateur Radio Society's annual Hamfest. Sunday, August 26th is the date. Many prizes will be awarded and an HT-37 tops the list. Registration will be $2.00 and the dinner is an extra $1.35. Club secretary is K9JQY and you'll find him at 2021 East Franklin Street, Evansville 11, Ind.

Ohio

The Warren A.R.A. of Warren, Ohio will hold its fifth annual get-together on Sunday, August 26th at the Trumbell County Fairgrounds beginning at noon. Registration is $1.50 and there will be many fine prizes, auction, swap and shop, etc. There will be a talk-in station for mobile visitors. Advance registration and information may be obtained from Imogene Kalman, 112 Shirley Lane N.W., Warren, Ohio.

Riverside Park in Findley, Ohio will be the gathering point for the Findley Radio Club's annual Hamfest on September 9th. Advance registration $1.00; $1.50 at the gate. Excellent playground and picnic facilities for the entire family. Mobile talk-ins on 3812 kc and 50.490 mc. Tickets and info from Jim Silverling, K8HDZ, McComb, Ohio.

New Jersey

The South Jersey Radio Association will hold its annual hamfest on Sept. 9 (rain date Sept. 30) at Molia Farms, Malaga, New Jersey. Advance registration is $1.50 before September 3. Days activities will include 2 and 6 meter transmitter hunts, swap shop, OM XYL and Harmonic door prizes. Talk-in by K2AA on 2, 6, 10 and 75. Registration is being handled by Herb Brooks, K2BG, 800 Lincoln Avenue, Polmyra, New Jersey.

San Francisco

The Martin A.R.C. will hold its annual family picnic in Paradise Park on August 26th. The Park is on the Tiburon Peninsula just west of the Naval Depot. There is no admission charge and action commences at 11 A.M. Hugh Cassidy, WA6AUD, 77 Coleman Drive, San Rafael, Calif., will give you more info.

Excitingly *New!* WRL Meteor Transmitter

AT A PRICE EVERYONE CAN AFFORD

Enjoy All Modes! SIDEBAND-AM-CW

Powerful 175 Watts—Mobile—Compact—Fixed—Factory Wired

Now, the experienced operator or beginner can enjoy a powerful economical, factory wired and fully guaranteed Transmitter • 175 Watts-CW, 100 Watts-AM, 140 Watts (PEP) Double Side band • Simple-Switch for 75 Watt novice power •

METEOR SB-175
TRANSMITTER

$99.95
LESS P. S.

NO MONEY DOWN

"MORE WATTS PER DOLLAR"...

Beautifully designed and "built like a battleship," the **METEOR SB-175** gives you more transmitting power for the money than ever before. The wrap around ventilated steel case is finished in coppertone and black. Gold anodized aluminum front panel with sharp black lettering.

Factory Wired — Operates on all Bands, 80 Through 10 Meters — Full 100% Modulation — One Knob Band Switching — Rugged Chassis, 18 Gauge Steel, Cadmium Plated — Automatic Grid Drive — Mobile Mounting Provisions — No High Voltage on Key — Compact . . . 5" High — 11⅞" Wide by 8" Deep. (Net Wt. 10 lb.) — Power Requirements: 600 VDC at 275MA, 300 VDC at 150 MA and 6/12 V filaments.

WRITE TODAY FOR COMPLETE INFORMATION ABOUT THIS EXCITINGLY
NEW WRL METEOR TRANSMITTER

F.O.B. WRL

this is the house the hams built!

WORLD RADIO LABORATORIES

3415 WEST BROADWAY . . . COUNCIL BLUFFS, IOWA

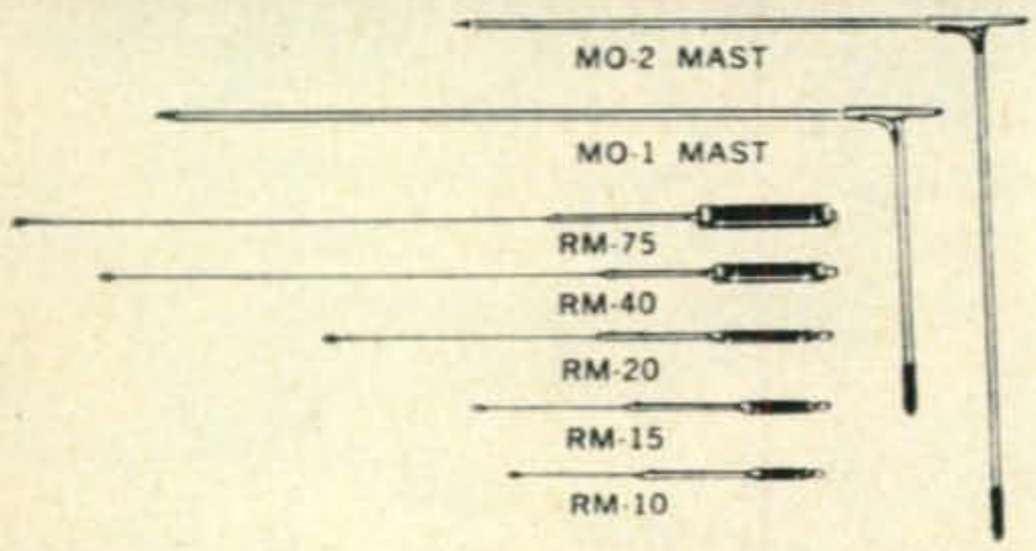
CABLE WRLI • WESTERN UNION WUX

For further information, check number 17, on page 126

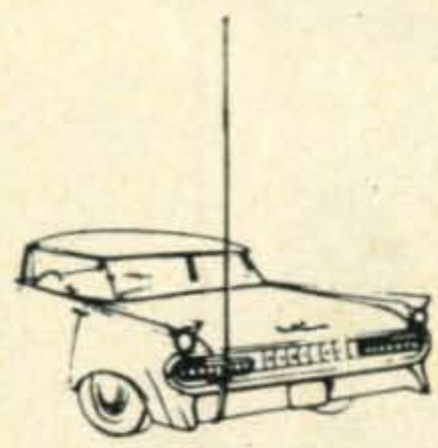
GOOD MOBILES GO

HUSTLER

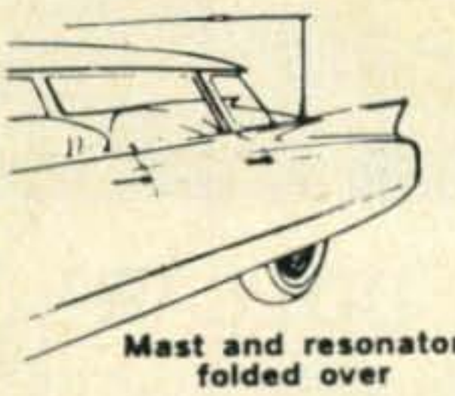
MOBILE ANTENNA
10-15-20-40-75- METERS



Buy only the mast and resonators for the bands you operate. NO NEED FOR MATCHING DEVICES, NO FEED LINE LENGTH PROBLEMS. Use any length of 52 ohm cable. New, efficient concept of center loading. Each resonator has a coil specially designed for maximum radiation for a particular band. Center frequency tuning is by an adjustable stainless rod in the resonator. The fold-over aluminum mast permits instant interchange of resonators. Mast folds over for garage storage. Mast has 3/8-24 base stud to fit standard mobile mounts, but will perform better with New-Tronic mounts. Power rating is 75 watts dc input A.M. - 250 watts PEP input for SSB.



Mast and resonator in mobiling position



Mast and resonator folded over

RESONATOR WILL WORK PROPERLY ONLY IF USED WITH MO-1 OR MO-2 MASTS. ANTENNA ASSEMBLY CONSISTS OF 1 MAST and 1 RESONATOR.

MODEL	DESCRIPTION	TOT. HGT. of ASSY.	NET
MO- 1	54" mast folds at 15" fr. base	Rear deck or fender	$ 7.95
MO- 2	54" mast folds at 27" fr. base	Bumper	7.95
RM-10	10 meter resonator	80" max. - 75" min.	5.95
RM-15	15 meter resonator	81" max. - 76" min.	6.95
RM-20	20 meter resonator	83" max. - 78" min.	7.95
RM-40	40 meter resonator	92" max. - 87" min.	9.95
RM-75	75 meter resonator	97" max. - 91" min.	11.95

ANY MAST OR RESONATOR MAY BE PURCHASED SEPARATELY

MODEL BM-1 BUMPER MOUNT

Flat alloy steel strap fits any shape bumper, large or small. "J" bolts require only ¼" clearance between top of bumper and car body. Heavily chrome plated 1½" die cast Zamak ball has ⅜"-24 thread. Adjustable for true vertical position. Gray Cycolac base. Heavily cadmium plated.... $6.95

Ask your distributor to show you these and other fine NEW-TRONICS products. Write for literature on the complete NEW-TRONICS line.

NEW-TRONICS CORP.
3455 Vega Avenue Cleveland 13, Ohio

For further information, check number 18, on page 126

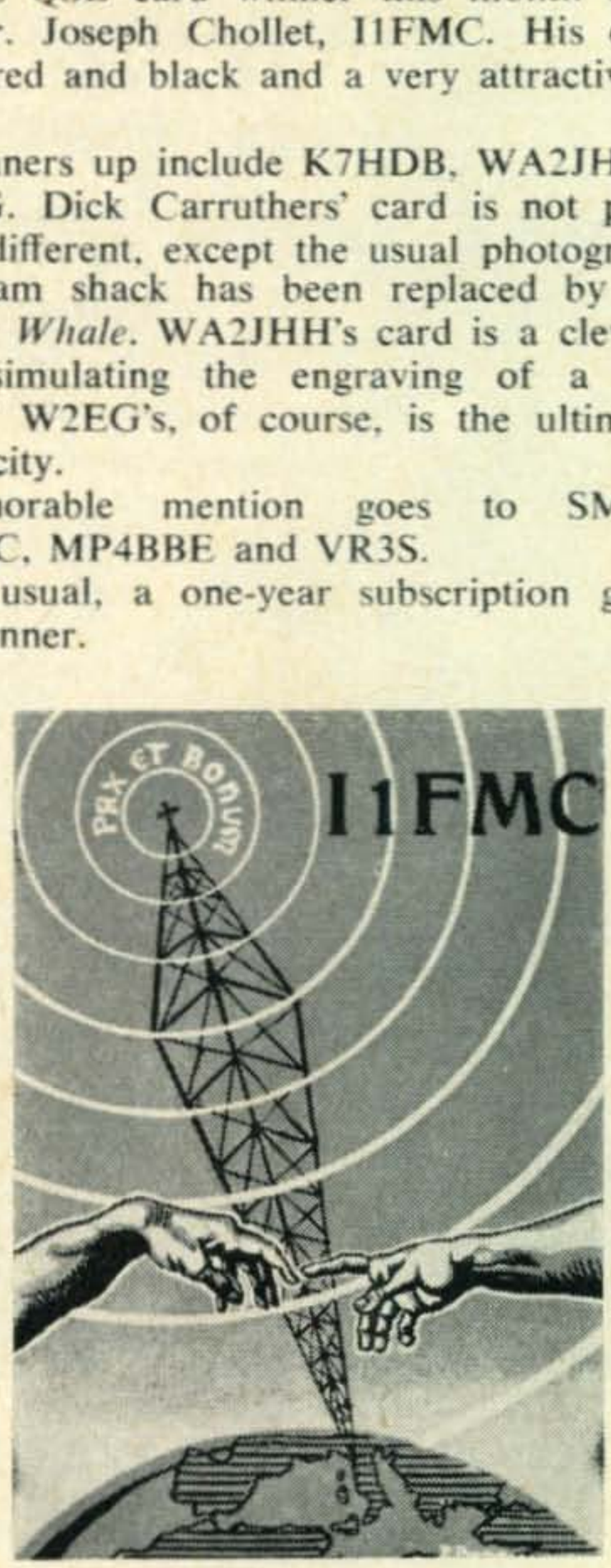
QSL contest

THE QSL card winner this month is Rev. Fr. Joseph Chollet, I1FMC. His card is blue, red and black and a very attractive card it is!

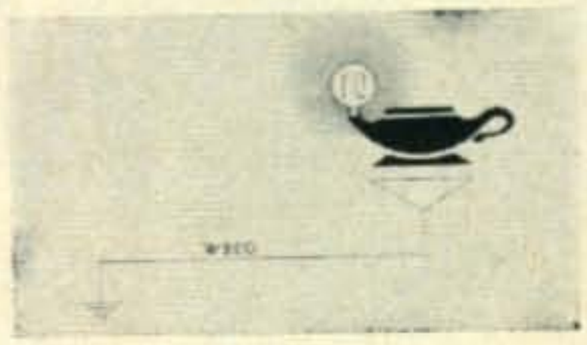
Runners up include K7HDB, WA2JHH and W2EG. Dick Carruthers' card is not particularly different, except the usual photograph of the ham shack has been replaced by a 51' *Sperm Whale*. WA2JHH's card is a clever design simulating the engraving of a "green back." W2EG's, of course, is the ultimate in simplicity.

Honorable mention goes to SM7CZP, CR7BC, MP4BBE and VR3S.

As usual, a one-year subscription goes to the winner.



Runners Up



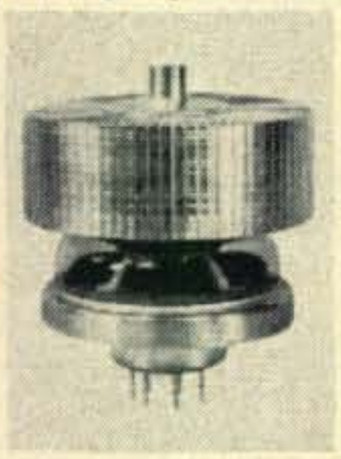
PATTERN FOR PERFORMANCE

Here is a straightforward approach to the problem of preventing electrons from returning to the screen region of a transmitting tube. When channeled into beams like those below, electrons reach the anode, where they do their useful work. Penta's exclusive, patented vane-type suppressor grid does the trick.

The characteristics of Penta tubes employing this electrode geometry approach those of the theoretically perfect beam tube. Plate current is practically independent of plate voltage. Kinks and wiggles are absent. Plate voltage can swing well below screen voltage without appreciable loss of current.

The result is outstanding linearity, efficiency, stability. Penta's PL-172, for example, delivers 1000 watts of Class AB_1 useful output at only 2000 plate volts . . . more than 1500 watts at maximum Class AB_1 ratings. Introduced in 1955, Penta tubes with vane-type suppressor grids are in important equipment the world over, and their use in high-quality linear amplifiers is growing daily.

You, too, can enjoy the advantages of this years-ahead design by specifying the PL-177A, PL-175A or PL-172 for 100-watt to 1.5-kilowatt power output applications. Detailed, factual data sheets are available for the asking. Ask also for your copy of "Transmitting Tubes for Linear Amplifier Service," which explains how and why this exclusive Penta design provides outstanding performance.

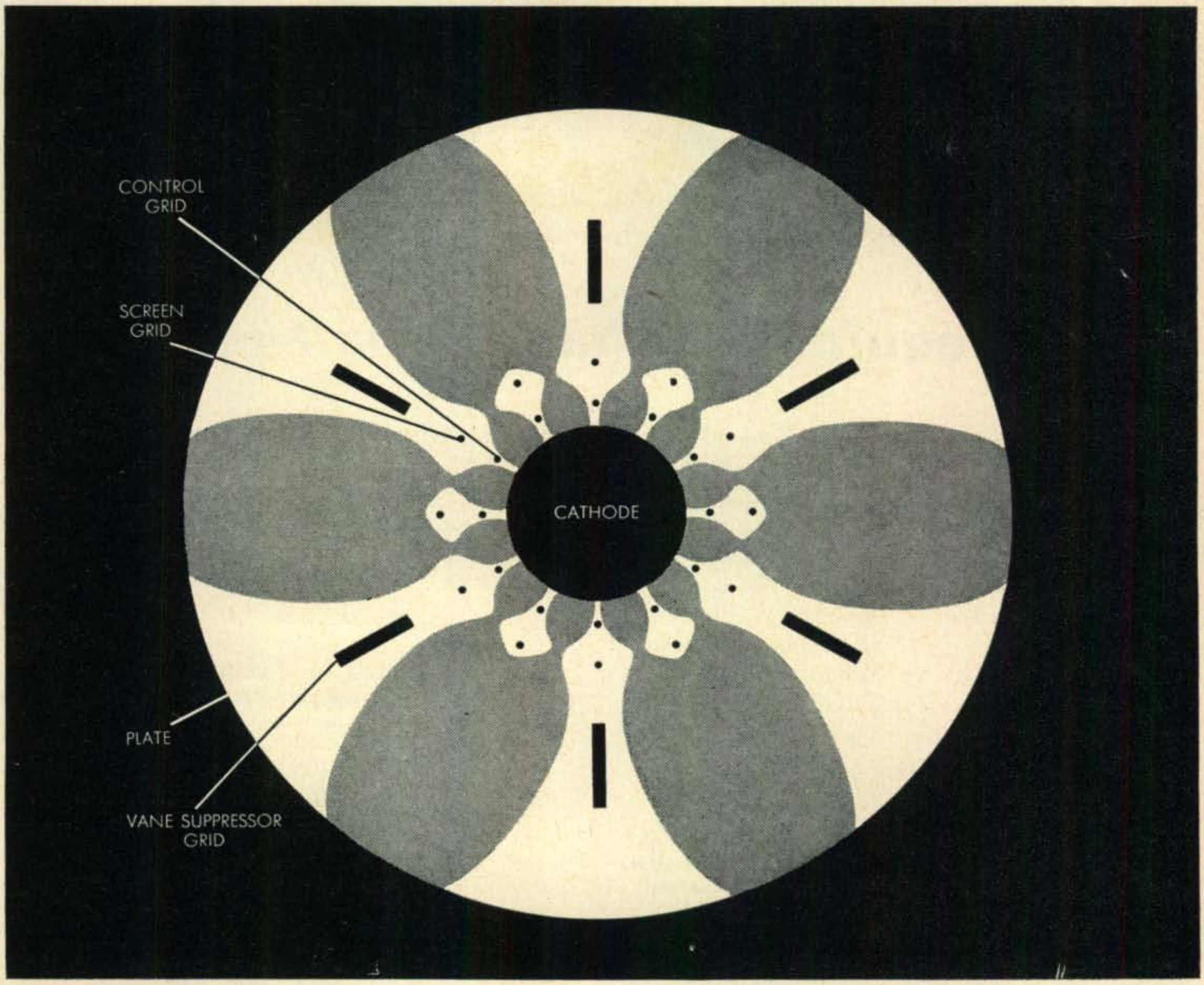


PL-172 1000W beam pentode. High-output Class AB_1 linear amplifier.

PL-175A 400W beam pentode. Popular Class AB_1 linear amplifier.

PL-177A 75W beam pentode. To 175mc. Highly efficient at plate voltages as low as 600v.

PENTA LABORATORIES, INC. 312 North Nopal Street
Santa Barbara, California



For further information, check number 19, on page 126

equips his shack at half-price with

Wise Amateur Radio operators know that they can depend upon Heath for quality, dependability and performance at lowest cost! Savings realized through easy, do-it-yourself kit construction, make it possible for the radio amateur to equip his station with complete facilities at savings of up to 50%! You also enjoy latest engineering design and features for top performance and convenient operation. Whatever your need, whatever your interest . . . "Mobile", "Fixed", AM, CW or SSB . . . there's a Heathkit product to fill it! The handy accessories shown above are only a few of the many money-saving Heathkits available to make better contacts, more conveniently, and with added fun.

1. MONITOR SCOPE: Specially designed for Amateur use! Displays envelope, AF and RF trapezoid patterns. Ideal for checking "flat-topping" and non-linearity in SSB linear amplifiers, observing modulation characteristics of AM & SSB transmitters plus quality of received signals. Use on amateur bands 160 through 6 meters. Built-in two tone test generator. 10 lbs.

Kit HO-10...no money down, $6 mo.....**$59.95**

2. REFLECTED POWER METER: Checks efficiency of antenna system by measuring forward and reflected power or standing wave ratio. Handles a peak power of well over 1 kilowatt and may be left in the antenna system feed line at all times. Matches 50 or 75 ohm lines. Covers 160 through 6 meters. 2 lbs.

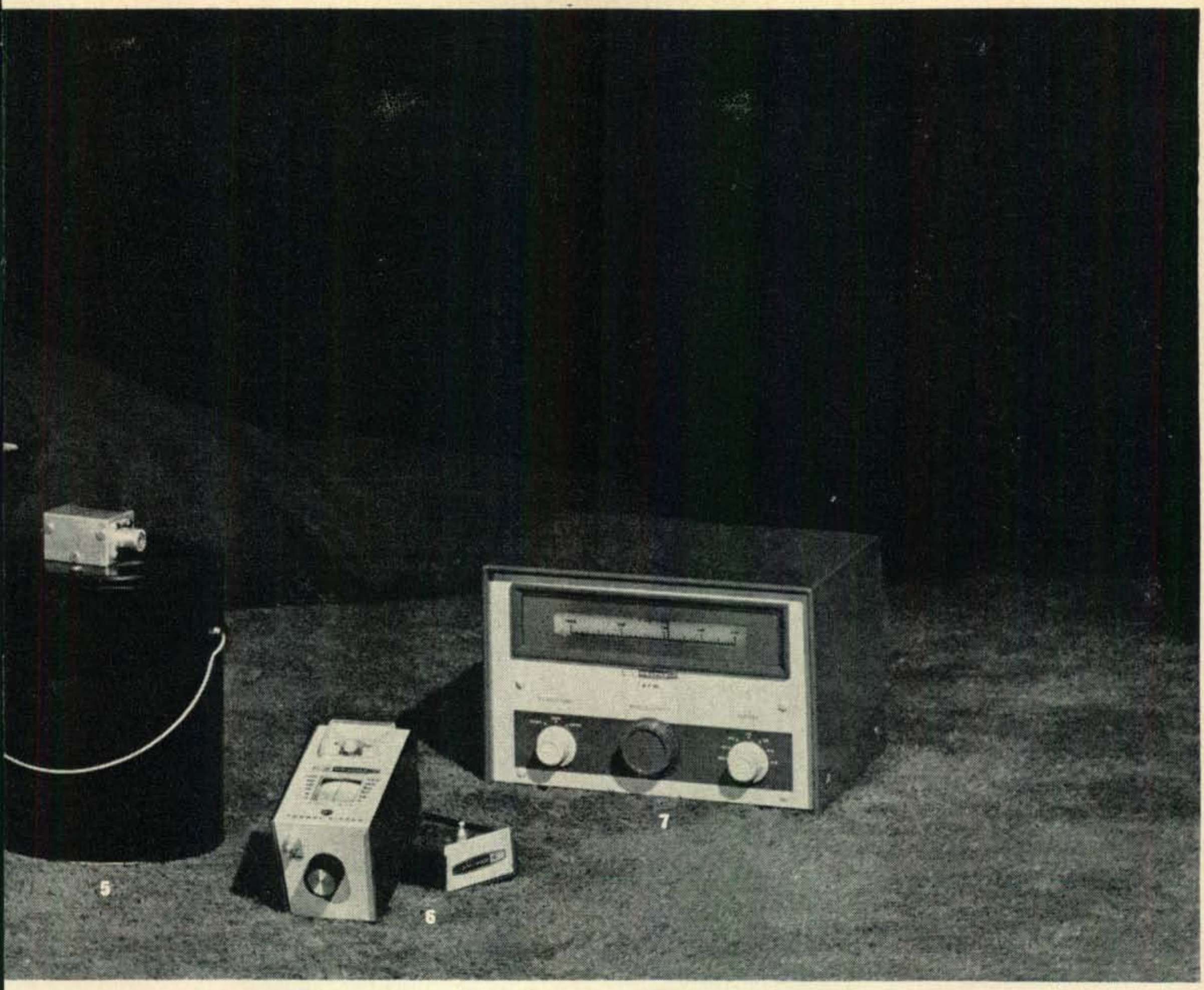
Kit HM-11.....**$15.95**

3. 100 KC CRYSTAL CALIBRATOR: Perfect for checking VFO's, receivers and other communications gear! Provides precise output every 100 kc from 100 kc to 54 mc. Circuit is transistorized and battery powered for complete portability. .005% crystal included. 1 lb.

Kit HD-20.....**$14.95**

4. RF POWER METER: Samples RF radiation near antenna to give continuous indication of relative power output of transmitter. Sensitive 200 ua meter. Requires no external source of power for operation. Covers 100 kc to 250 mc range. 2 lbs.

Kit PM-2.....**$12.95**



easy-to-build Heathkits

5. "CANTENNA" TRANSMITTER DUMMY LOAD: Permits testing or servicing transmitting equipment "off-the-air" . . . no TVI, QRM, or FCC violations to worry about! Handles up to 1 kilowatt I.C.A.S. with less than 1.5 V. S. W. R. up to 300 megacycles. Features oil-cooled resistor (oil not included). 2 lbs.

Kit HN-31 ..... **$9.95**

6. "TUNNEL DIPPER": Exclusive with Heath! . . . a solid-state grid dip oscillator. Hundreds of uses in amateur radio work. Covers 3 to 260 mc. Color-matched coils and dial scales. Battery powered, use it anywhere! Complete with rugged, epoxy coated coils, protective cover. 3 lbs.

Kit HM-10 . . . no money down, $5 mo. **$34.95**

7. VARIABLE FREQUENCY OSCILLATOR: Provides complete coverage of amateur bands, 80 through 2 meters. Rugged, reliable and loaded with special features for top performance and stability. Use with most transmitters designed for grid-block or cathode keying. All connecting cables furnished. 12 lbs.

Kit HG-10 . . . no money down, $5 mo. **$34.95**

FREE CATALOG:
Send today for your free 100 page Heathkit Catalog. Over 250 different quality kits to choose from. Save up to 50% with Heathkit.

HEATHKIT® by Daystrom

HEATH COMPANY
Benton Harbor 12, Michigan

Please send Free Heathkit catalog

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

For further information, check number 20, on page 126

ONE TUBE, 30 WATTS

BY E. H. MARRINER*, W6BLZ

With the appearance of the Compactron version of the 6146 the author lost no time in working up a 30 watt all-band c.w. vacation portable transmitter

LIKE to experiment with a new tube? G. E. has marketed a Compactron; type 7984. Since it was designed for mobile operation it has a 13.5 volt filament† (at 0.58 amps) but in most other respects is similar to the popular 6146. It is rated at 46 watts power output as compared with the rated 35 watts of the 6146 under similar conditions.

The tube is shorter (2.5" high, seated, 1.56" diameter) due to the fact that it has neither a composiion base nor a top plate cap. The elimination of the base shortens the leads within the tube and reduces the interelectrode capacitance thus providing a significant advantage at the higher frequencies. The Grid No. 1 to plate capacitance is 0.17 mmf, input capacitance 15 mmf and output capacitance 5.5 mmf. Other advantages include a lower screen circuit power requirment and multiple pin connections for the various elements to make r.f. grounding easier. A basing diagram is shown in fig. 1.

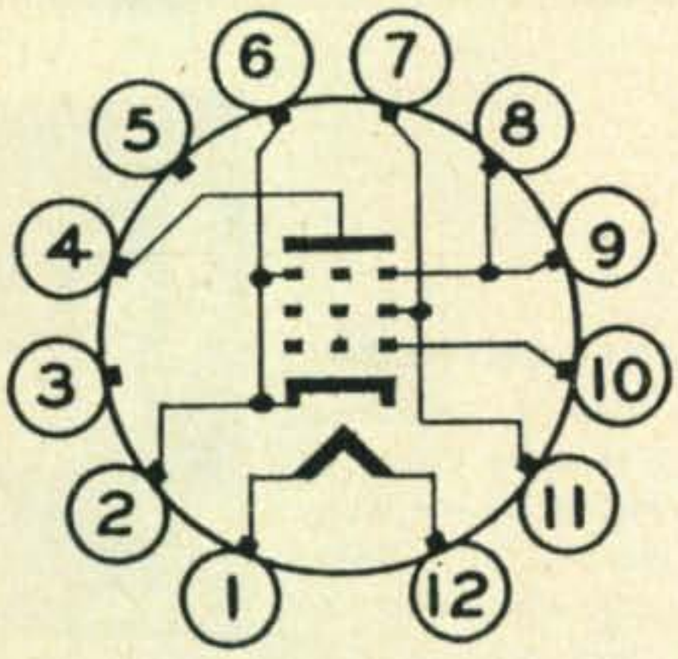


Fig. 1—Basing diagram of the 7984, a Compactron equivalent of the 6146. It is housed in a T-12 glass envelope and is of single end construction. It can deliver 46 watts output at 175 megacycles.

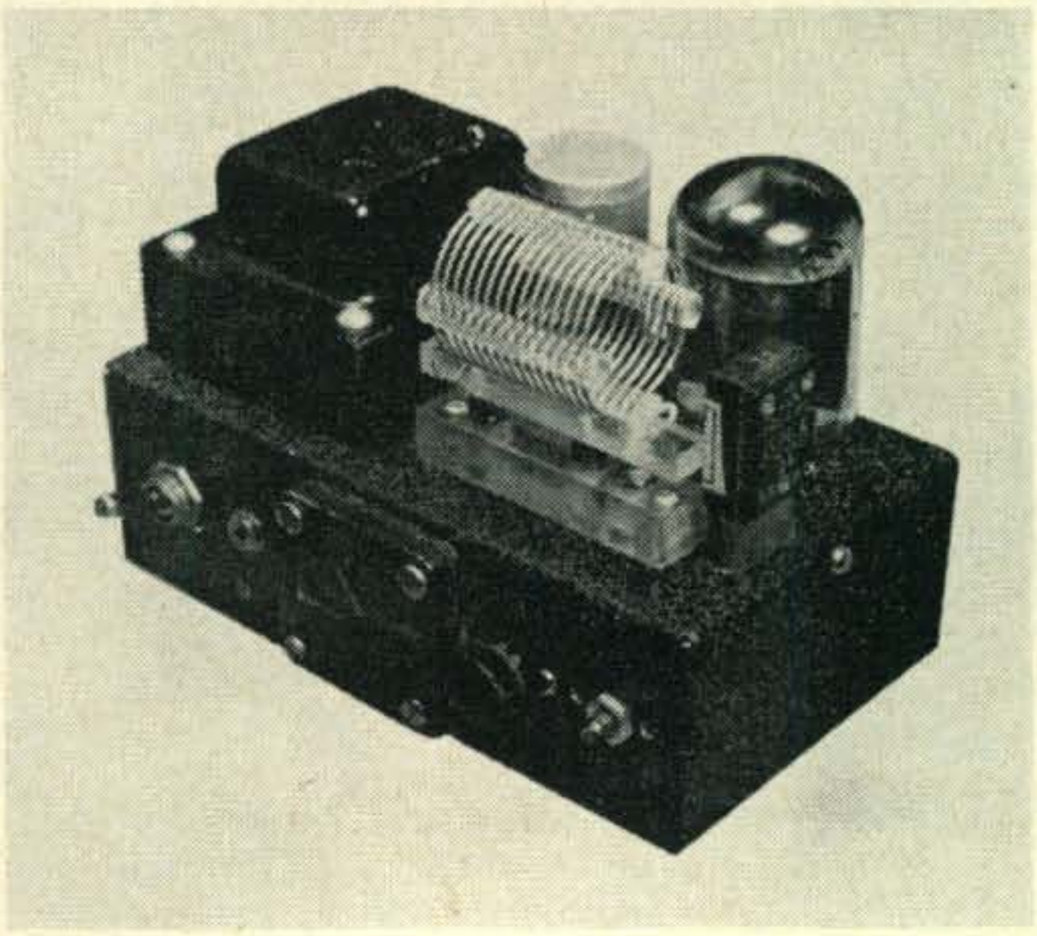
The temptation to design a small transmitter around this tube was too great and here are the results. It is housed in a 6¼ × 3¼ inch chassis, complete with power supply. It has a power input of 30 watts and can light up a 40 watt bulb to respectable intensity.

Diode rectifiers are used in the power supply and eliminate the use of the 5 volt 3 ampere filament winding. This winding can then be placed in series with the 6.3 winding to provide adequate filament voltage for the 7984. For c.w., short duty cycle operation, the 50 ma transformer can be operated at 100 ma without heating.

Theory

This one tube transmitter is a high power oscillator, using the electron coupled Pierce circuit. It allows the plate circuit to be tuned to harmonics of the crystal with reasonable efficiency. For example, using a 7 mc crystal, output can be obtained on 28 mc at decreased power. The plate tank tuning circuit and loading do not affect the oscillation of the crystal unless normal plate current is exceeded. A low impedance dipole antenna of 50 ohms with coax feedline is matched by the pi-tuning output network and keeps the proper load on the transmitter.

Keying is accomplished by opening and closing the cathode circuit. A key click filter is made by shunting the key with a 1 mf capacitor in series with a 200 ohm resistor. A good active crystal will key at a speed of 40 w.p.m. Surplus FT-243 crystals with the metal cover plates



Top view of the one tube "Compactron" transmitter showing parts layout. The On-Off switch and key jack are to the left of the meter and the Plate and Antenna tuning controls are to the right.

*528 Colima Street, La Jolla, California.

†A 6.3 volt equivalent has been developed, type Y-1078. However this is experimental and is not yet available. G. E. plans to assign it a four digit number and release it sometime in the near future.

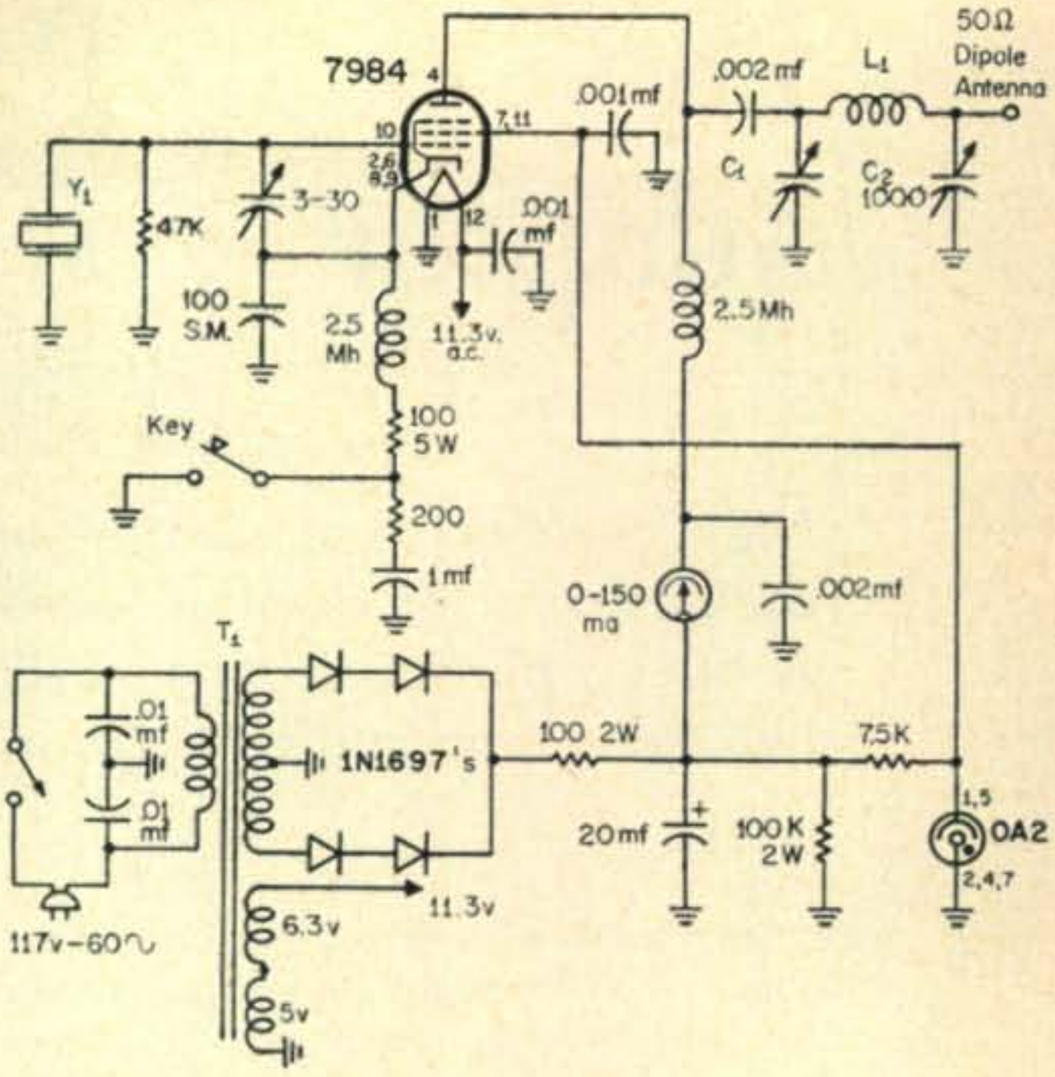


Fig. 2—Circuit of the 30 watt transmitter using the G.E. 7984 Compactron. For 80 meter operation C_1 must be shunted with a 100 mmf silver mica capacitor. All capacitors greater than one are in mmf, less than one in mf. Electrolytics are marked by polarity. Use disc ceramics wherever possible. All resistors are ½ watt unless otherwise indicated.

C_1—140 mmf APC Type.

C_2—365-1000 mmf compression trimmer. Reduced minimum value is necessary for the higher bands. See text.

L_1—80 meters 22t #1016 Air-Dux.
40 meters 15t #1010 Air-Dux.
20 meters 8t #1010 Air-Dux.
10/15 meters 6t #1208 Air-Dux.

T_1—325-0-325 at 50 ma, 5 v at 3 amps; 6.3 v at 2 amps. Chicago PV-50 or eqiuvalent.

on one side, have been used with success in this transmitter.

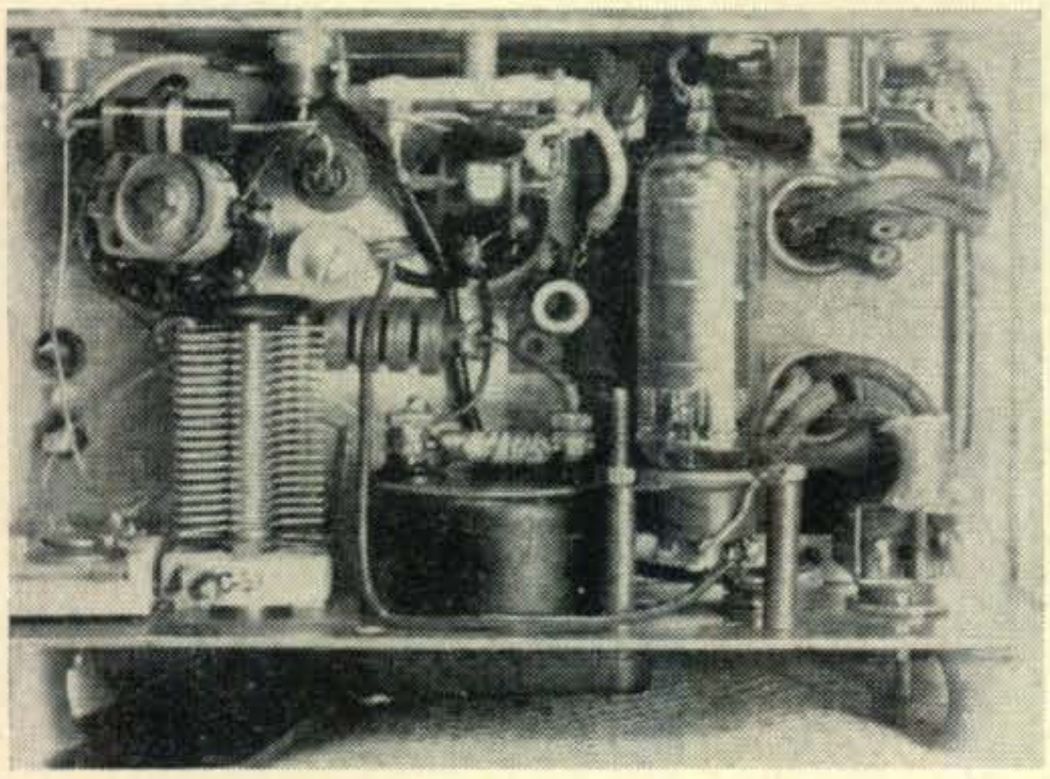
The 7984 tube is rated comparable to the 6146, but for this transmitter the following operating conditions were observed:

Plate voltage	330 v.d.c.
Screen Volts	150 v.d.c.
Plate Current	120 ma.
Plate Dissipation	20 watts

Construction

No particular problems are involved in the construction. Just make sure that in your layout all of the major parts fit; your junk box parts may have different sizes.

A surplus 0-1 ma meter was used because it was cheap. A shunt was made to extend the range to 0-150 ma by experimenting. Any small 1¾" meter 0-150 ma will eliminate the need to make a shunt. Be very careful if you make your shunt as it is only a few ohms, and if you increase the resistance too rapidly, you might destroy the meter. Nichrome wire is best to use, but any thin copper wire can be wound on a high value resistor body.



Bottom view of the one tube transmitter showing the compact parts arrangement. The 0A2 voltage regulator is mounted on standoffs, but may be placed above the chassis if your version has the room.

Because I am mostly interested in 20, 40 and 80 meter operation, the value of C_2, a compression type trimmer, ranges from 365 minimum to 1000 mmf. For 10-15 and 20 meter operation a smaller minimum value should be used. A transistor receiver type tuning capacitor for C_2 is another possibility for all band operation. Of course you could pad the plug in coils with additional capacity to obtain the proper value.

For safety from transients, each diode rectifier can be shunted with a .001 disk ceramic capacitor, or a 470K ½ watt resistor. This will prevent transients from damaging the rectifiers if lower p.i.v. types are used in place of the 600 p.i.v. types.

The plug-in coils are mounted on lucite strips. The pins were made from 6-32 machine screws with the thread turned down so they would fit into earphone tip jacks. The coil winding data is given in fig. 2 and the holder and socket dimensions in fig. 3.

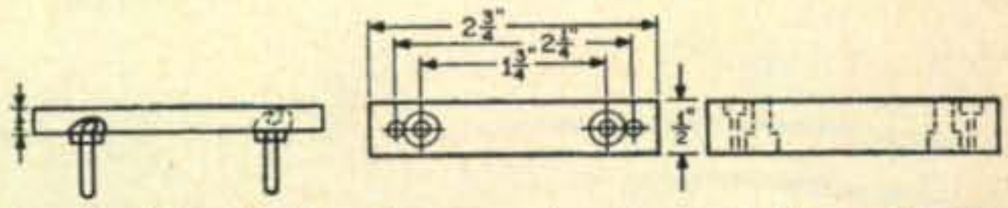


Fig. 3—Details for the construction of the coil plug and receptacle. The pins on the plug are 6-32 screws with the threads removed. The upper portion of the screw-thread remains and is fitted into the tapped lucite strip. The base strip has two 4-40 holes counterbored on top for mounting and two holes for the tip jacks counterbored on the bottom for the nuts.

Adjustment

Couple a 40 watt lamp bulb to the output. Press the key and rotate C_1 until the lamp lights. Also adjust C_2 for maximum output. The plate meter should dip to 30 ma and then increase to 100 ma as C_2 is adjusted. When the output circuit is tuned, adjust C_1 for most output and good keying. It does not have too much effect

[*Continued on page 119*]

The "Scan-Pan" Panoramic Adaptor

BY FRED JOHNSON*, ZL2AMJ

The Scan-Pan is a simple panoramic adaptor employing an oscilloscope for display, sweep source and vertical amplifiers. A 60 kc portion of the spectrum is shown. The unit contains two tubes and a diode capacitor for modulating the oscillator.

A PREVIOUS issue of *CQ* featured the Pan-Scope.[1] This brought panoramic reception within the grasp of all scope owners. The Scan-Pan is an extension of this idea. The number of tubes has been slashed to two; power supply requirements are thus correspondingly reduced. However, the big improvement is in the somewhat easier construction.

Because of the reduced quantity of components and the use of a "baking-pan" as a chassis, the construction time should be only a few hours. None of the effectiveness of a big panoramic adaptor has been lost. All controls can be preset, and the unit hidden out of sight behind the scope. Standard components are used throughout and alignment is simple.

Before we consider the circuit diagram in detail, tarry a moment and consider how we obtain panoramic reception with all its advantages.

Panoramic Reception

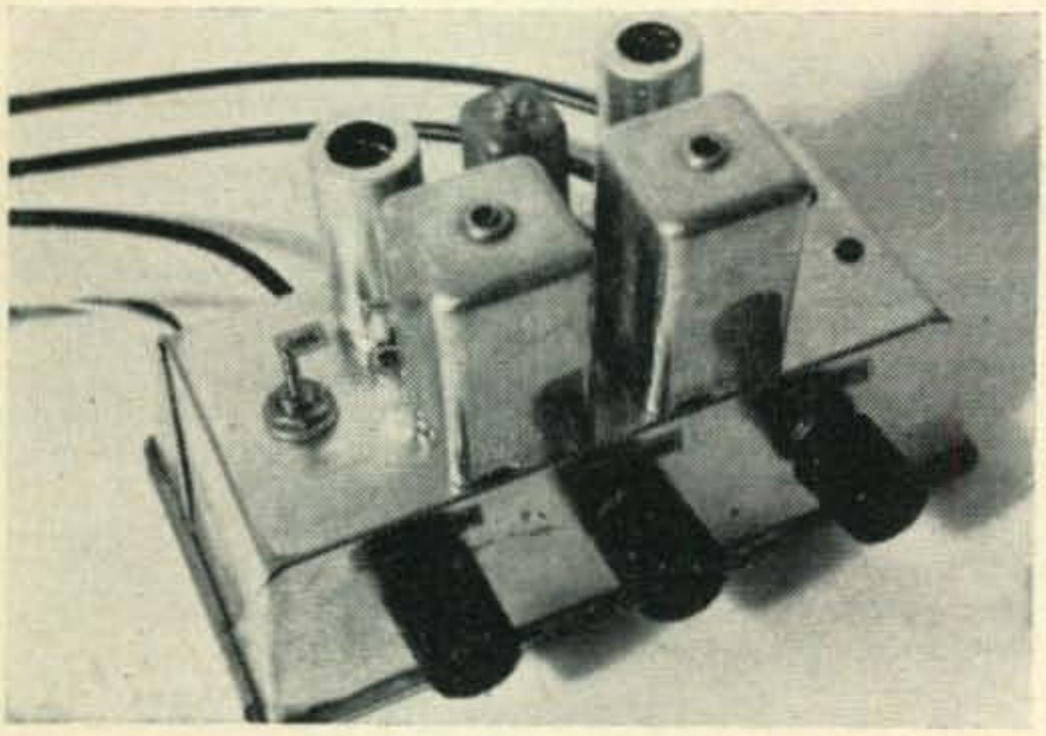
Figure 1 shows a typical picture as seen on the scope screen. The receiver is tuned to the signal represented at the center of the trace (s.s.b.). Ten kc above is an unmodulated carrier and above that again, two stations causing mutual QRM. Below in frequency the band is clear, and 20 kc below there is an a.m. station working. All this can be seen without making any adjustment to the receiver. This is only part of the story. The blip representing the signal can be used for signal strength reporting much better than any S meter. Fading, signals popping on and off the band, drifting carriers, wide signals, splatter etc., can all be seen. Quite candidly it is the most useful addition that can be made to a shack.

The screen is really a graph of signal amplitude (vertical axis) plotted against frequency (horizontal axis). The signal being heard from the speaker is the one centered on the screen. As the receiver is tuned over the band the picture moves across the screen, always exposing a 60 kc part of the spectrum to view. A 60 kc sweep is adequate for ham use; any more and detail is lost. It is impossible to cover the many things you can see with this gadget; you have to see it to believe it.

A block diagram of a panoramic adaptor is shown in fig. 2. The i.f. signals from the plate of the receiver mixer tube are amplified in a broad-band amplifier. This amplifier is adjusted so that a flat 60 kc band of signals is presented to the mixer grid. This band has a center frequency of 465 kc, the same as the main receiver. The mixer is fed with a 565 kc signal from the local oscillator (more about this later). Output from the mixer passes via a selective 100 kc stage to the detector. The detector output is amplified and fed to the Y

*15 Byron Street, Upper Hutt, New Zealand.

[1] Hutton, Louis I., "The Pan-Scope," *CQ*, Feb. 1960, p. 46.



Front view of the Scan-Pan panoramic adaptor. The two 100 kc i.f. transformers are located up front with the 465 kc unit centered to the rear. Inductor L_3 adjustment slug is on the left. The controls are from r. to l., Sweep Width, Centering and Gain.

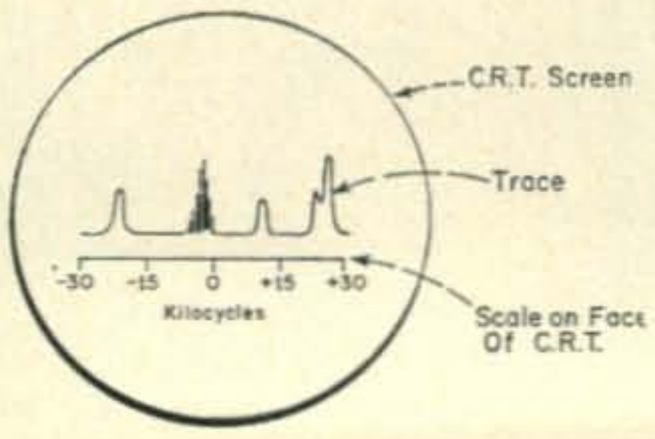


Fig. 1—A typical panoramic display. The various signals shown are described in the text.

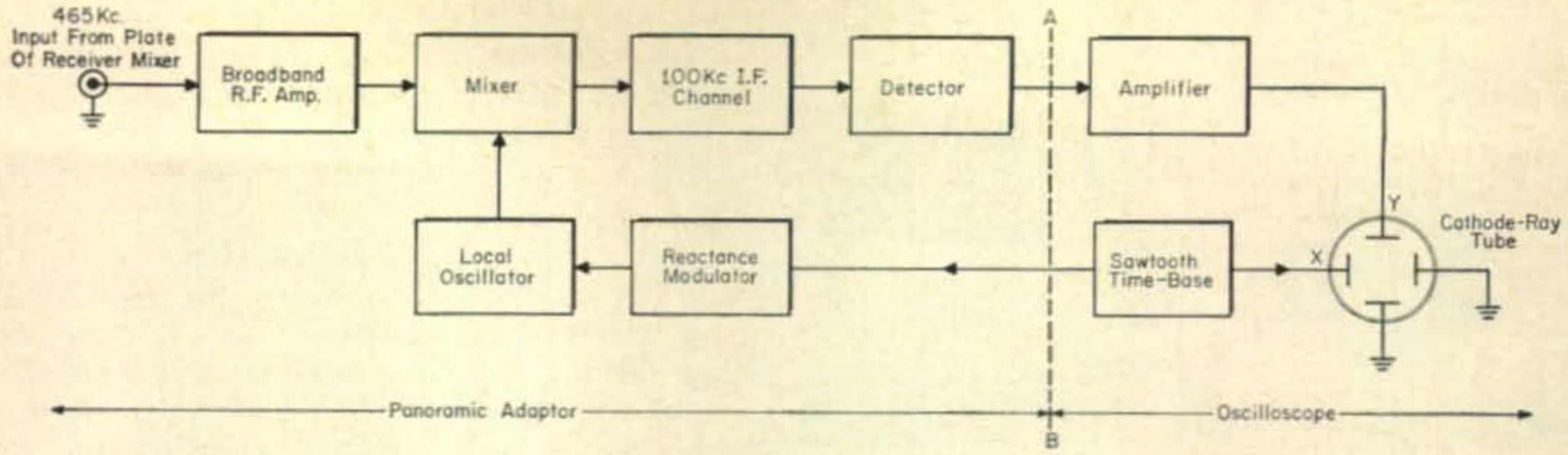


Fig. 2—Block diagram of a panoramic adaptor. All stages to the right of line AB are contained in the oscilloscope.

plates of a cathode ray tube. This provides the amplitude or vertical axis.

The frequency axis is obtained from a sawtooth oscillator which sweeps the spot linearly across the screen at about 30 c.p.s. The spot flyback is suppressed so that only the forward stroke is visible. This same sawtooth oscillator reactance modulates the 565 kc local oscillator sweeping it up and down in frequency through a 60 kc band. All signals in the 60 kc band presented to the mixer grid are successively sampled. The result on the screen is a graph of signal amplitude plotted against frequency.

A close inspection of fig. 2 reveals that all components to the right of line A-B already exist in the oscilloscope, while those to the left are what have to be assembled to give us panoramic reception—quite a collection.

The Panoramic Adaptor

Modern tubes and components make a lot of simplification possible. The circuit of the Scan-Pan is shown in fig. 3. Note how few components are used.

The pentode V_{1A}, is a broadband r.f. stage. It has a single tuned circuit in the grid and a 465 kc i.f. transformer in the plate. This transformer has the tuning capacitors altered but more about this later. Pentode V_{2A} is a mixer. The plate feeds a pair of 100 kc i.f. transformers connected back-to-back. The triode section, V_{1B}, is a plate detector, and the audio (or more correctly the video) signal is taken from the plate via a length of coax or shielded lead to the Y amplifier of the scope.

The local oscillator, V_{2B}, is a Hartley type. A voltage-dependent silicon capacitor (CR_1) is connected in a parallel with the oscillator tuned circuit. A blocking capacitor is used to prevent any d.c. appearing across CR_1 from being shorted out by L_8. This diode is a type BA102 manufactured by Philips, and marketed by Amperex. It is quite cheap—costs about the same as a receiving type tube. The cathode (white band)

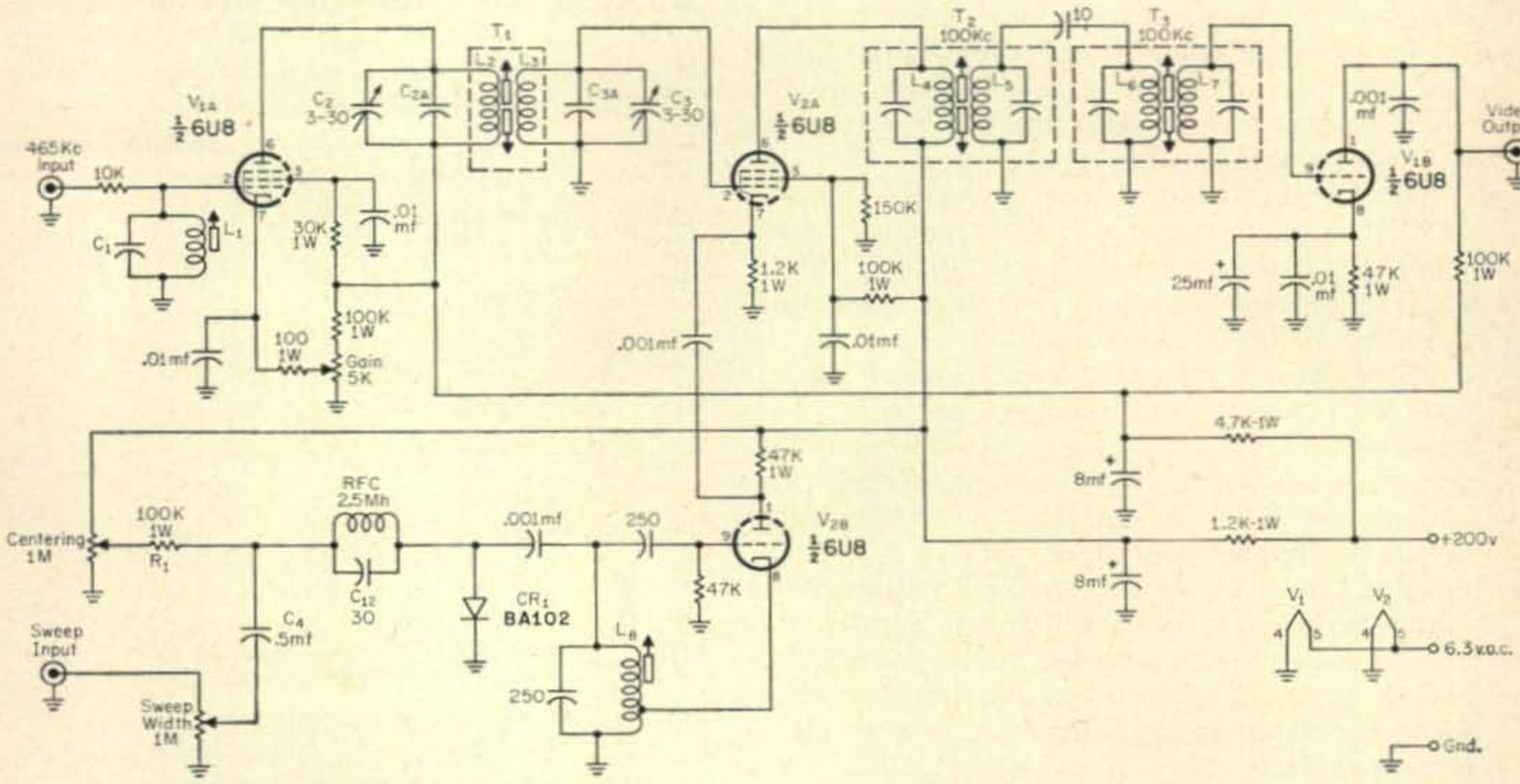
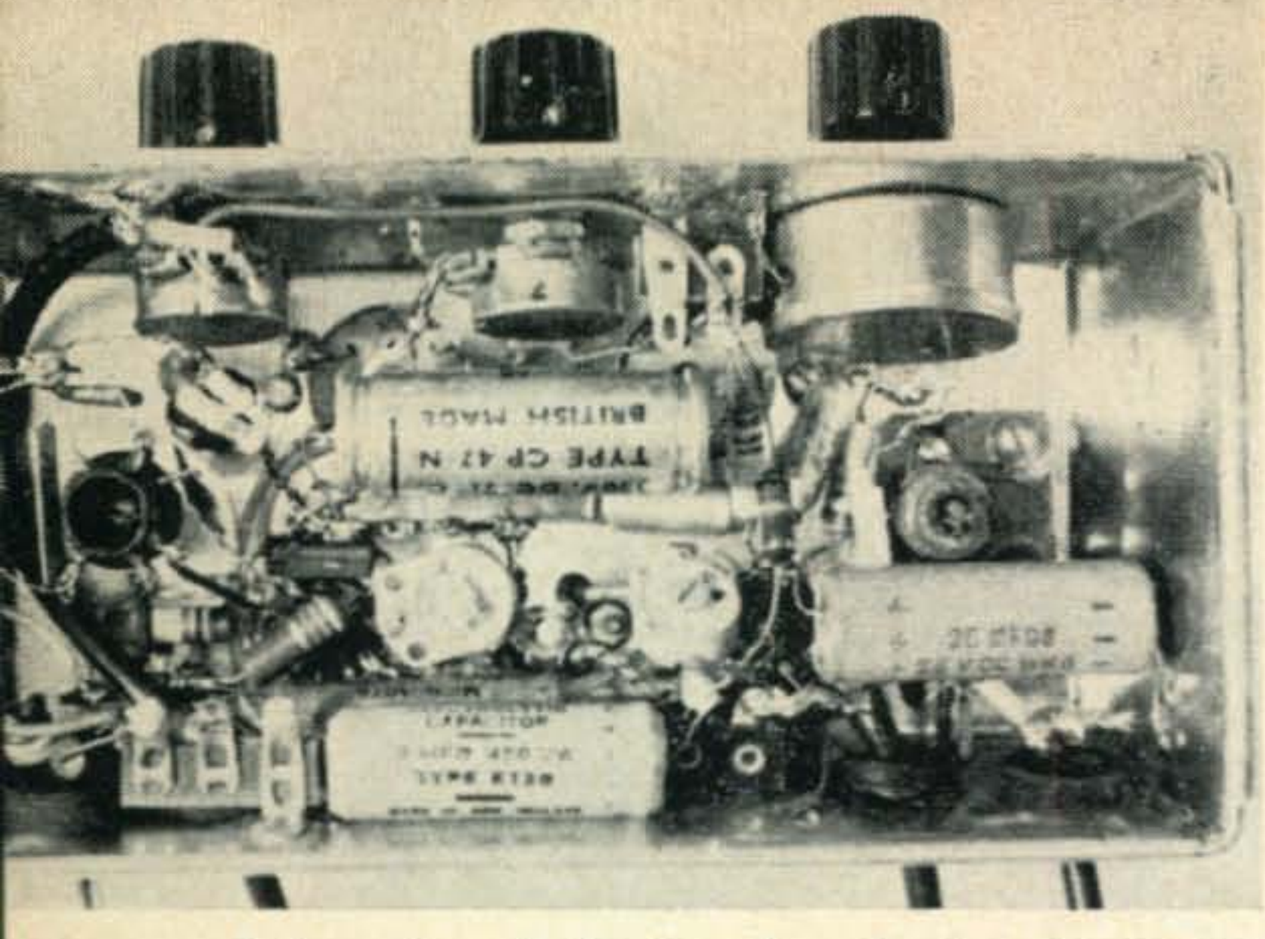


Fig. 3—Circuit of the "Scan-Pan" panoramic adaptor. Components L_1 and C_1 are a winding taken from a 465 kc slug tuned i.f. transformer. T_1 is a 465 kc i.f. with the internal capacitors removed and C_{2A} and C_{3A} values determined experimentally. Oscillator coil L_8 consists of 100 turns of # 30 e. on a ½" diameter slug tuned form tapped at 30 turns up. All resistors are ½ watt unless otherwise noted; all capacitors greater in value than 1 are in mmf, less than 1 in mf unless otherwise noted.



Bottom view of the Scan-Pan showing the compact placement of parts. All cables exit from the rear through grommets.

is grounded. A parallel tuned circuit isolates the sweep circuitry from the local oscillator r.f.

A negative going sawtooth signal is fed from the scope to the SWEEP WIDTH potentiometer. D.c. bias is obtained from the B plus line via the CENTERING control. The diode acts as a capacitor when its "plate" is negative with respect to the cathode (*i.e.*, reverse-biased). A first glance at the circuit diagram seems to indicate that the diode is connected the wrong way round, but remember that the sweep input is *negative* going (more about this later) and the junction of R_1 and C_4 is driven below ground potential. To achieve a linear sweep it is necessary to obtain the correct diode operating point. This is adjusted during the alignment procedure using the CENTERING and SWEEP WIDTH controls. Leaving the SWEEP WIDTH preset enables a calibrated scale marked in kilocycles to be mounted on the cathode ray tube screen—an invaluable aid. If your scope produces a positive going sawtooth sweep, it would be necessary to reverse the diode connections and change the d.c. bias level. There are not many scopes in use today that do not produce a negative going sweep.

The 465 kc tuned circuit in the grid of V_{1A} (L_1, C_1) is a winding and capacitor taken from an i.f. transformer. The interstage 465 kc i.f. transformer (T_1) has both fixed capacitors removed before it is mounted. External to the transformer are mounted two trimmer capacitors with some fixed capacity in parallel if necessary. This transformer is stagger-tuned, one circuit tuned higher in frequency than 465 kc and the other lower. This will be detailed in the alignment procedure.

Tube types could be changed if required, but remember that there is not much gain in this unit, the Y amplifiers in the scope (two stages usually) providing the necessary lift. A separate local oscillator is a necessity. A type 6BA7 mixer-oscillator was tried but "pulling" occurred on strong signals. This showed up as an annoying horizontal shift.

Construction

The chassis is a baking-pan 8 × 4 × 2 inches deep (approx.). The layout is not critical, and it does not seem necessary to provide a detailed drilling chart for the chassis. The photographs show the position of components and should prove quite sufficient for any constructor who wishes to duplicate the unit.

Connecting Up

The connections necessary to make the unit operational are shown in fig. 4. Note that a 10 mmf capacitor is used in the receiver as a coupling capacitor for the 465 kc i.f. signals. The video output lead is connected to the Y amplifier of the scope. Check to see if a blocking-capacitor is provided in the scope; one about 0.5 mf should be satisfactory. Note that the video output lead is *hot*.

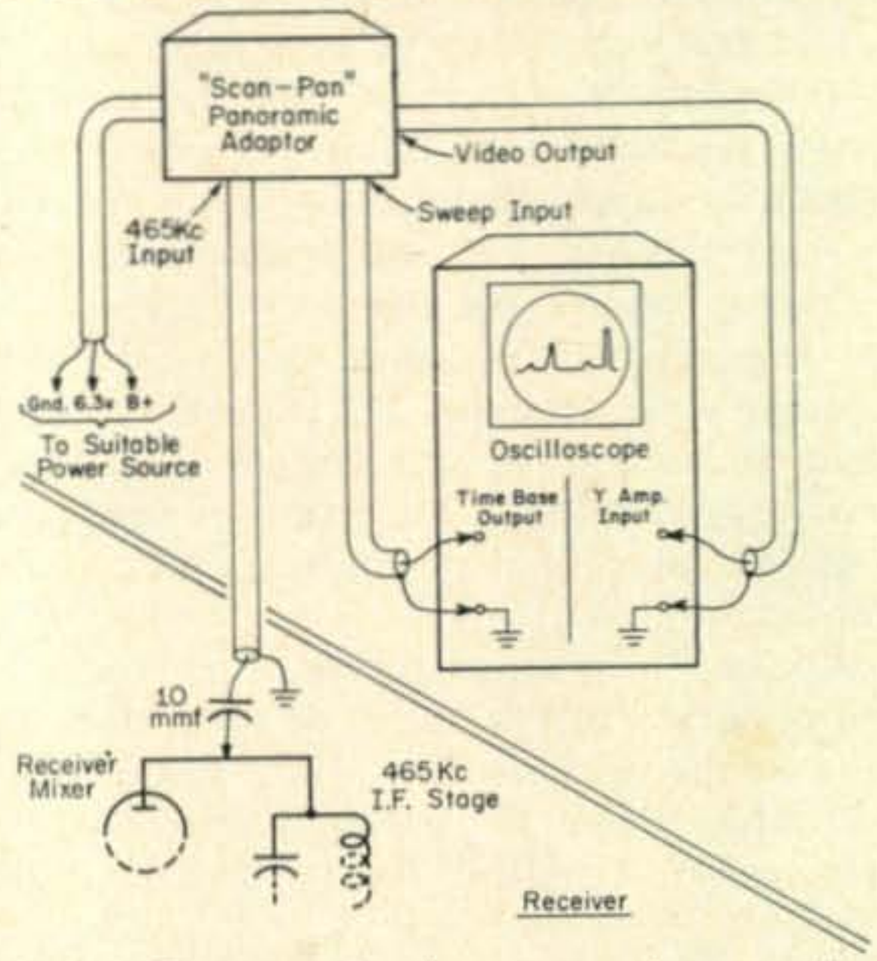


Fig. 4—Diagram showing external connections.

The sweep is taken from the scope. Some scopes already provide this take-off point as a front panel terminal. If you have to fish around in the scope to find a suitable point, try connecting the lead to the moving arm of the timebase COARSE FREQUENCY switch. In most scopes this will be the ideal spot. The power-cable is connected to some suitable source.

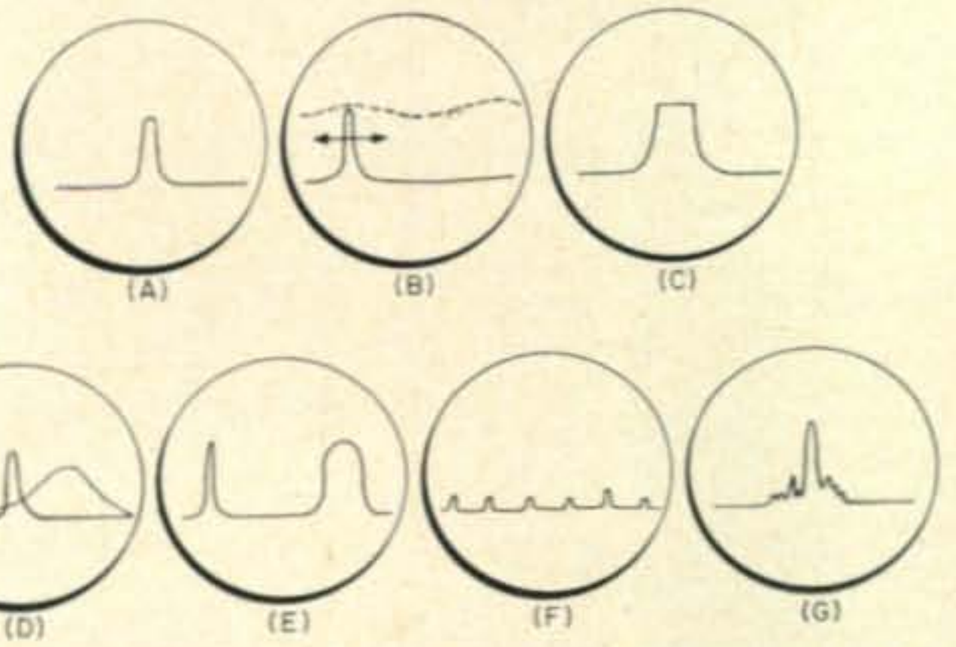


Fig. 5—(A) Response of the 100 kc channel. (B) Response of the 465 kc broadband i.f. channel should be flat when moved across the screen. (C) Signal overload causing flat topping. (D) Lack of retrace blanking in the scope causes a second visible trace. (E) Non linear sweep causing the same blip to have different widths in each position. (F) Appearance of 10 kc marker pips. (G) Appearance of severe a.m. overmodulation (splatter).

Lining Up

With the unit hooked up, scope, receiver, and Scan-Pan warmed up, the time has arrived to commence hunting for pictures. the first figure to aim for is fig. 5A, and is perhaps best obtained in the following manner.

Tune in a strong local signal. Use a crystal calibrator, v.f.o., grid dip oscillator, or something similar. Set both the Scan-Pan GAIN and SWEEP WIDTH controls to maximum. Run the Scan-Pan local oscillator slug, L_8, through its tuning range. At some part of its travel a "blip" similar to fig. 5A should appear. If the entire horizontal trace jumps at some stage of slug travel, then the sweep circuitry is not operating.

When a pattern similar to fig. 5A is obtained, tune the 100 kc i.f. slugs for the sharpest (*i.e.*, the slimmest and tallest) blip that you can get. This blip is the response curve of the 100 kc i.f. channel, the curve you would get if you aligned it with a sweep generator.

The next step is to align the 465 kc circuitry. Connecting the Scan-Pan to the receiver will detune the receiver's first i.f. transformer. Before proceeding any further with alignment of the unit, realign this receiver i.f. in the normal manner. That done, swing the receiver main tuning dial back and forth. The blip on the screen should move across at the same time. The amplitude of the blip will change as it moves across the screen. The 465 kc circuits L_1, L_2, and L_3 are now adjusted so that this blip amplitude remains reasonably constant throughout its travel. Figure 5B shows the effect. The easiest way is to set the blip in the center of the screen (listen to the signal tuned in properly on the receiver—adjust L_8 if necessary) and peak L_1. Now adjust the receiver tuning dial to put the blip on one side of the screen. Peak either L_2 or L_3. Do the same again with the blip on the other side of the screen, but this time peak the other tuned circuit. Now run the blip right across the screen. Fiddle with all three tuned circuits until a flat response is obtained. This is far harder to explain than to achieve. It has not been found necessary to alter the coupling of the interstage 465 kc i.f. transformer. By careful fiddling with all three tuned circuits (both trimmers and slugs) it has been possible to get a level response with little effort. You could try damping the tuned circuits with resistance if the response persists in being bumpy.

Interpretation Of Patterns

If at any time a picture similar to fig. 5C is obtained, back off the gain control, or the receiver r.f. gain control and turn up the Y amplifier gain in the scope. Adjustments to the blip amplitude when the top is cut off are impossible!

If your scope has poor fly back suppression you may get a picture similar to fig. 5D. There is only one way to satisfactorily get rid of this—hook up some form of flyback suppression in the scope. Interpreting a picture like this is difficult.

Non-linearity of sweep shows up as in fig. 5E. A signal gets wider as it is moved across the screen. This may be due to a non-linear sweep in the scope or a non-linear frequency sweep in the Scan-Pan. The former can only be cured by investigating the scope X deflection circuitry, and the latter by adjustment of the CENTERING control, SWEEP-WIDTH control, and L_8. It should be possible to get a linear sweep right across the screen and yet keep the point where the signal is heard from the speaker centered on the screen.

A crystal calibrator is an invaluable aid for frequency check purposes. A typical picture of 10 kc marker pips is shown in fig. 5F.

Severe overmodulation on an a.m. signal shows up in many ways, one of these is shown in fig. 5G. It is hard to describe the pictures seen because they are constantly changing. It is amazing the number of stations that change frequency, while transmitting at full power, passing other stations on the way. Some operators seem to have no idea of what constitutes good operating practice!

Other Uses

The unit can be used in a variety of ways to give further "facilities." A pair of headphones can be connected to the "video output" lead (use a blocking capacitor), and with the sweep control reduced to zero, the 100 kc stages act as a form of *Q*-5er. By adjusting the slug in coil L_8 it is possible to tune the *Q-5*er up and down through about 40 kc. The receiver now has two outputs, the normal speaker and the *Q-5*er headphones, each tuned to different signals. ■

"I think it was terribly thoughtful of him to quarantine himself out here."

Adapter for the KWM-1 to 40 Meters

BY TAL LAWRENCE*, W5GVZ

With the drop in activity on 10, 15 and 20 many KWM-1 owners are frustrated. They would like to operate on 40 and 80 but won't modify their pride and joy. Here, however, is a converter that will permit operation of the KWM-1 on 40 meters and requires no modifications on the KWM-1.

THE many owners of the Collins KWM-1 are well aware that it is, without a doubt, one of the finest pieces of amateur gear ever built. These owners, however, face a problem; the long-range propagation forecasts look very bad for 10, 15 and 20 meters for an extended time. KWM-1 owners will all agree that it would be wonderful to be able to operate the M-1 on 40 meters, but also agree that modifications would be made over their dead bodies.

The little adapter described here will allow the M-1 to be operated on 40 meter lower sideband while retaining all of the very desirable features of 10, 15 and 20 meter operation. No modifications *of any kind* are made to the M-1.

Receiver Theory of Operation

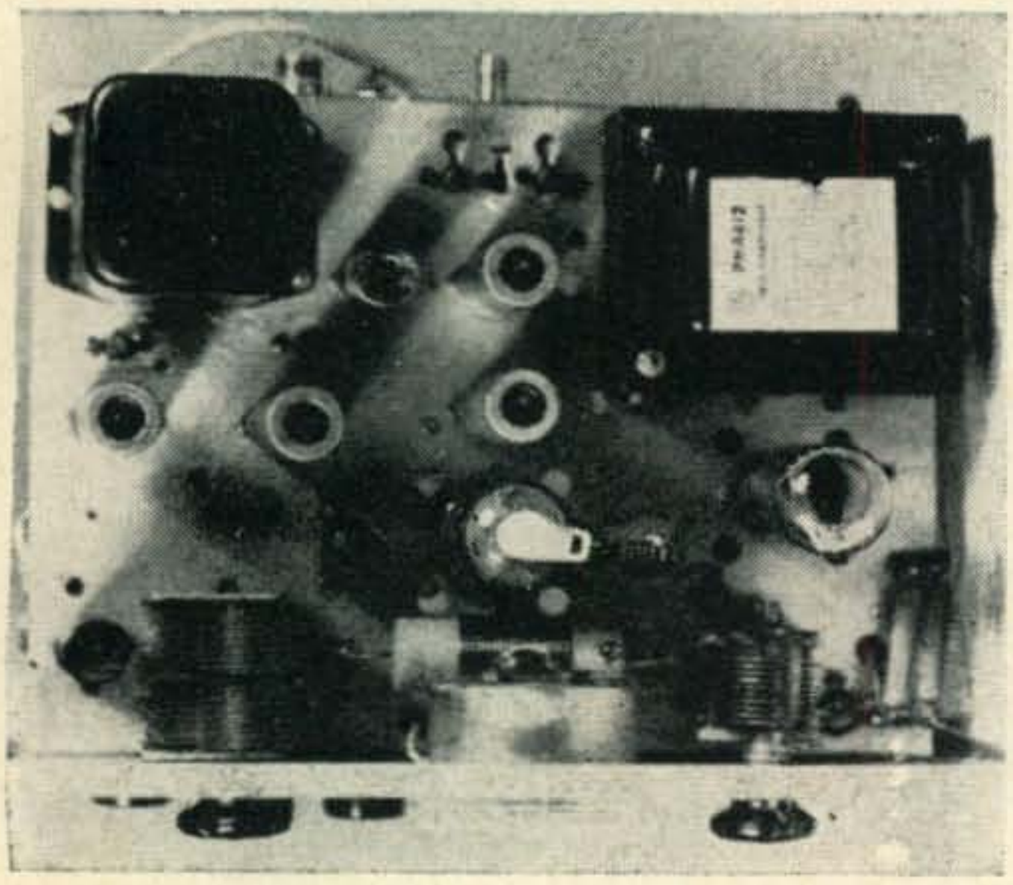
Referring to fig. 1, a 7200 kc l.s.b. signal is received by V_1, amplified and sent to V_2, a conventional mixer. Stage V_2 also receives a 28,300 kc signal from V_3. Mixing action is as follows: 28,300 kc minus 7,200 kc l.s.b. equals 21,100 kc u.s.b. The only undesirable feature here is that the M-1 dial reads backwards. In other words 21,000 kc will be the high end of 40 meters (28,300 minus 21,000 equals 7,300 kc). Also 21,100 kc on the M-1 dial will be the low end of 40 meters since we are subtracting in order to invert sidebands. Just remember, 100 on the M-1 dial is 7200 kc lower sideband providing the 5660 kc crystal is accurate.

Transmitter Theory of Operation

Again referring to fig. 1, the KWM-1 is tuned to 21,100 kc, at full output, and is fed through a swamping network capacity coupled to the cathode of mixer V_4. A 28,300 kc signal from V_3 is introduced here and mixing is as follows: 28,300 kc minus 21,100 kc u.s.b. equals 7,200 kc l.s.b. The 7,200 to 7,300 kc l.s.b. signal from V_4 is à lá Collins and must be kept this way as the power level is increased.

We're now receiving 7,200-7,300 kc l.s.b. as good, or possibly better than anyone on 40 meters and, we're transmitting on 7,200 kc to 7,300 kc l.s.b. as clean as a "hound's tooth." The power output from V_4 is, of course, very low. At this point you may use an existing 40 meter amplifier, or you might pick up a bargain commercial rig. You may also want to build your own pet version of a driver final at any power level you feel adequate. The above is the secret of how it is done and this little Transceiver Heterodyner is the "Heart" of the package.

*717 Thersa Drive, Ft. Worth, Texas.



Top view of the Heterodyner. The r.f. amplifier, V_1, is located at the lower left. Above it is V_2, the receiver mixer. To the right is V_3, the crystal oscillator followed by V_6 the driver. The crystal may be seen just below V_3. The 6146 is located behind the front panel and above it is V_6 the driver and V_4 the transmitter mixer. The v.r. tube is to the left of V_4. Inductor L_9 is below the panel meter with the Antenna Loading capacitor on the left and p.a. Plate tuning on the right.

Fig. 1—Circuit diagram of a transmitting and receiving converter enabling the KWM-1 to be used on 40 meters. Switching of the unit from transmit to receive is accomplished by relay K_1, actuated by the KWM-1 vox circuit. All capacitor values greater than one are in mmf and all resistors are ½ watt unless otherwise noted.

K_1—3 p.d.t. 110 v.a.c. coil. Potter Brumfield MR14A or equiv.

L_1, L_3—3t hookup wire on cold end of L2 and L4.

L_2, L_4—17t #20, 1" diam., 16 t.p.i. B&W 3015.

L_5—40t #22 on ⅞" diam. form closewound.

L_6—14t #22 on ⅜" diam. form closewound.

L_7—79t #22 on ½" diam. form closewound.

L_8—79t #22 on ½" diam. form closewound.

L_9—20t #12E on 1" form closewound.

PC_1—5t #16 on 100 ohm 1w resistor.

Power Supply

The 0A2 regulator source voltage must be properly adjusted so that the tube stays ignited when the unit is switched from transmit to receive. This may be done by juggling the value of the upper 20K resistor in the power supply voltage divider, if necessary.

The use of two 100 mf capacitors in series as part of the filter gives good dynamic regulation. The voltage will only vary from 530 to 505 volts with full voice or tone modulation.

The negative 50 volts for the 6146 bias is necessary for class AB1 operation as required for s.s.b. This 50 volts may be obtained from batteries, a bias supply (must be added), or picked up from the Collins power supply. The choice is yours. The photos show a bias pot as a front panel control (5K). This also is optional.

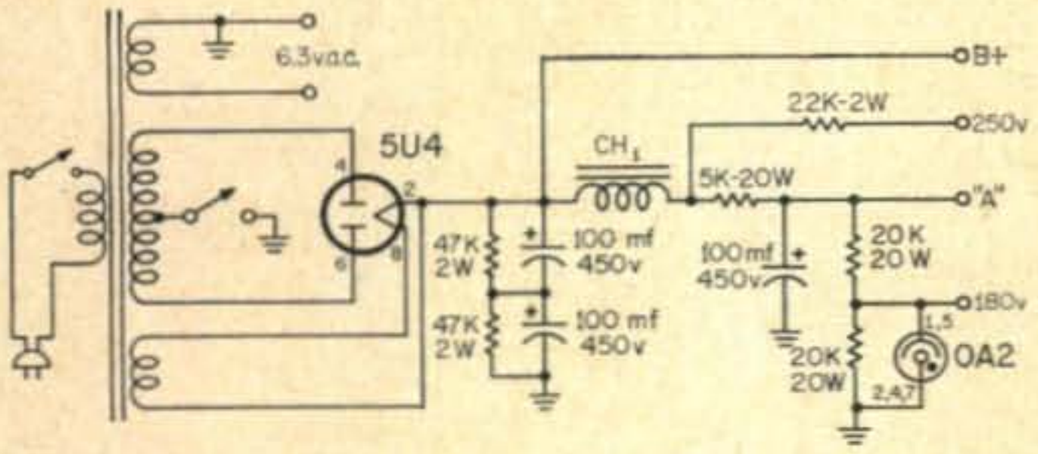
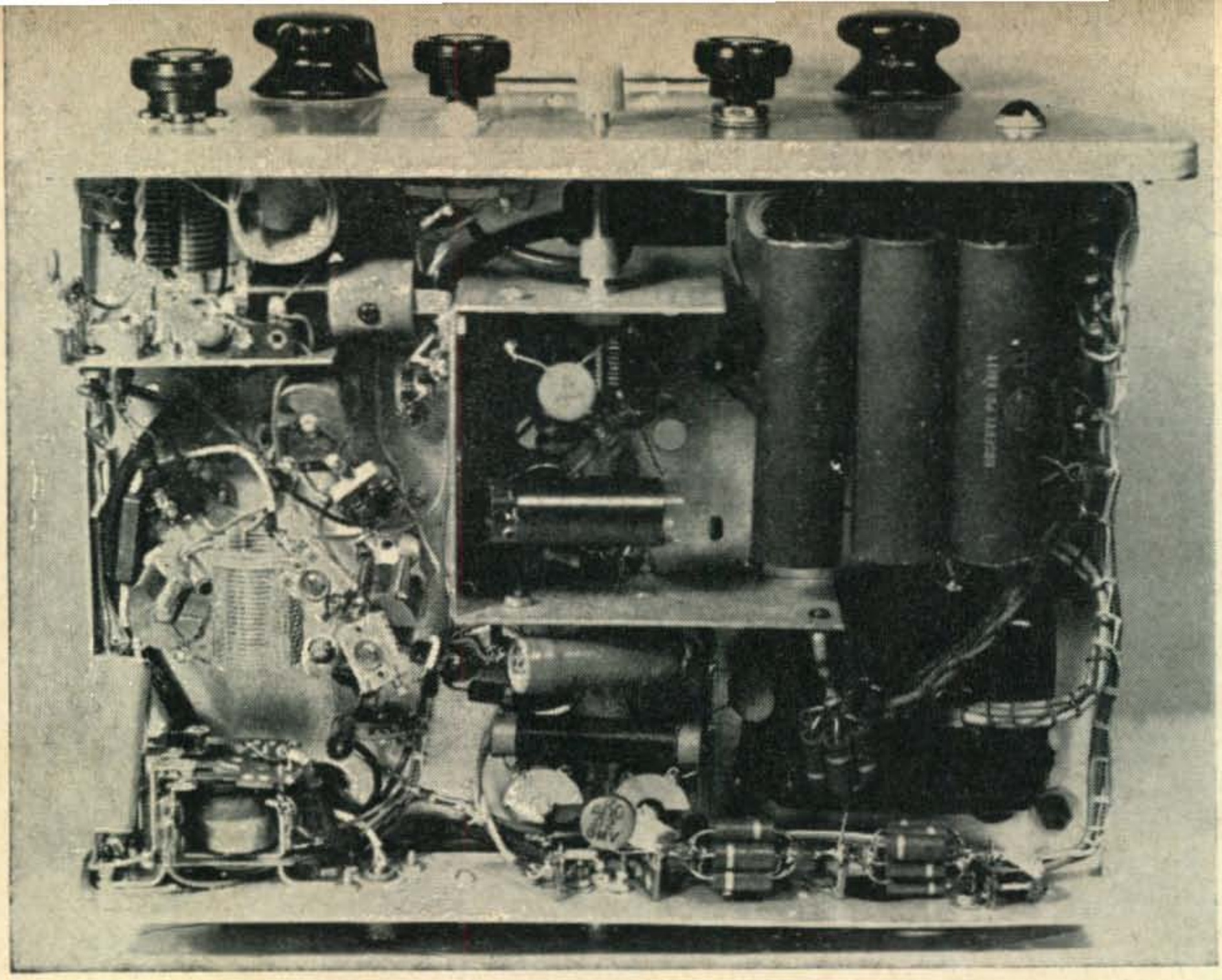


Fig. 2—Schematic of a power supply providing the various voltages necessary for the 40 meter KWM-1 adapter.

CH_1—4.5 hy 200 ma. Stancor C-1411.

T_1—800 v.c.t. 200 ma, 5.0 v. 3 a., 6.3 v. 5 a. Stancor PM-8412.

The relay K_1 performs a variety of functions and does a fine job of permitting transceive operation. It serves to apply the proper power supply voltages to the "Heterodyner" when the loads change during the shift from receive to transmit. The voltage to energize K_1 is taken from the Collins power supply. It is 117 v.a.c. keyed by the vox.



Bottom view of the Heterodyner showing parts placement. Inductors L_1 and L_2 are in the upper left hand corner along side the receiver R.F. Tuning. The rotary on-off switch is to the left, on the panel. Inductor L_5 is located behind L_1. Inductors L_3 and L_4 are just above the relay, K_1. Inductor L_8 and the driver tuning capacitor are located in the U shaped shield while L_7 is between the shield and the rear flange The input swamping network may be seen just above the power transformer. A bias pot is located to the right of the Driver Tuning, on the front panel.

Stability

The stability of the Heterodyner is dependent upon the 28,300 kc oscillator. It was for this reason that a 5,660 kc crystal was used and multiplied up to its fifth harmonic. Originally, a 28,300 kc overtone crystal was used and on-the-air reports indicated a few cycles difference between the receive and transmit frequencies. The circuit shown will provide perfect transceive operation. I obtained two surplus 5660 kc crystals and found their frequencies to be slightly off. Of the two, one was very active while the other was sluggish with the applied 150 volts. Do not increase the applied voltage or the crystal oscillator might drift due to crystal heat. It is safer to use an active crystal.

A pair of 6146 tubes in the final may be used rather than one as the power supply components employed could easily handle them. The coupling between the mixer, driver, final and the antenna is the familiar pi-network configuration. This tends to prevent strays, birdies and wild oscillations.

The KWM-1 input to the transmitter mixer, V_4, is fed through a swamping network made up of eighteen 150 ohm 2 watt resistors. Each leg of the network has 6 parallel resistors. The network presents an excellent impedance match for the KWM-1 and acts to reduce the input to V_4 to a safe level.

Construction

So you're ready to get on 40 meters in a hurry. Well, if you are not too inexperienced, it can be accomplished in no time at all. For those of you that are not too familiar with the building of heterodyne units, you had better enlist the aid of some old timer who is "hep" on such matters. These little heterodyne units can be real little demons if they are not properly tuned. You must have the following test equipment: a grid dip meter, a vacuum tube voltmeter with an r.f. probe and a certain degree of patience.

The Heterodyner, as shown in the photographs, was built on a defunct DX-40 chassis. The physical size was just about right for my requirements and many of the existing components of this unit were used. The power supply, driver stage and final amplifier are all convenional, and no difficulty should be encountered with their construction.

Receiver Tune Up

With no power on, grid dip L_2 to 7,200 kc, L_4 to 7,200 kc, L_5 to 5,660 kc and dip L_6 to 28,300 kc. Turn the power switch on and let the tubes warm up. Apply the plate power and, with the KWM-1 in the receive position on 21,100 kc, a slight amount of noise (or a signal possibly) will be heard.

Using a v.t.v.m., check V_{3A} to be sure it's oscillating. Adjust L_5 for stable operation by turning the plate power on and off a few times. Move the v.t.v m. to pin 2 of V_2, the 6U8 mixer, and adjust L_6 for maximum bias voltage.

Adjust the 100 mmf capacitors across L_2 and L_4 and the two 3-30 mmf coupling capac-

[*Continued on page 118*]

Return To Aves Island

BY JULIO PEÑA*, YV3BS

AVES ISLAND is hardly what one would expect to find described as a tropical paradise in a tourist directory. This little island, which is about 1500 feet long and about 200 feet wide, is a possession of Venezuela and is located 366 miles from the nearest point of the mother country. There is nothing of any interest there, no trees, no water; just sand and birds.

Aves Island literally translated means "Bird Island." No one will even venture a guess as to the magnitude of the bird population which can be seen in the accompanying photographs. One of the operators remarked that when all the birds take to the air at one time the sky looks as though a tremendous storm is brewing. They make so much noise that one must always speak in a very loud voice, just under a shout seems to be about the right intensity.

To the DX operator, all of these disadvantages are completely nullified by the fact that Aves Island is given separate country status. There have only been two YVØ operations in the past; the first in 1956 which was sponsored by the Venezuelan Radio Club under the call of YVØAA and the second in 1958 when Danny Weil (of *Yasme* fame) operated for a short period of time as YVØAB.[1, 2]

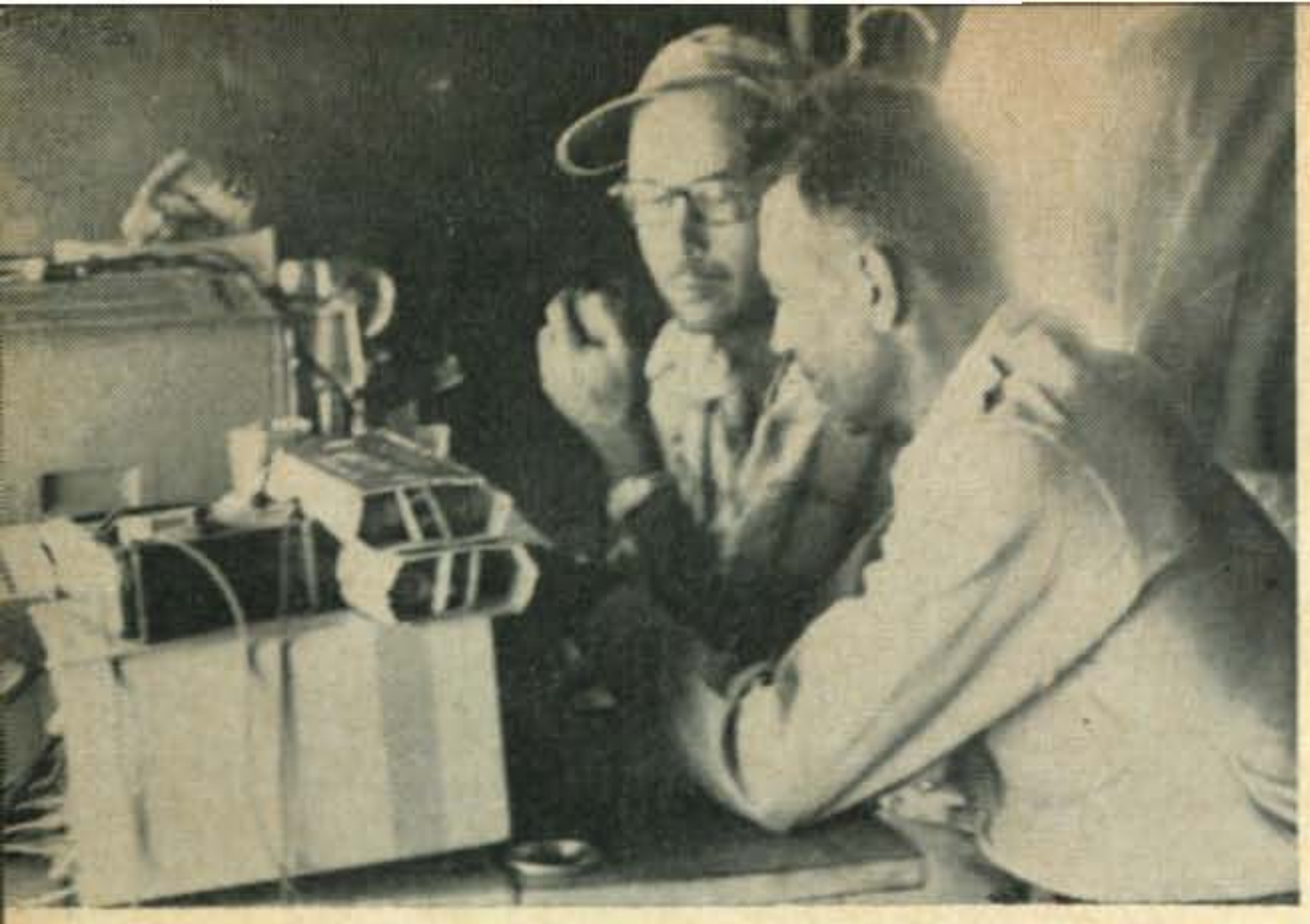
*Secretary, Radio Club of Venezuela, Ave. 20, N. 27-89 Barquisimeto (Lara), Venezuela, S. A.

The Trip

On January 1st, 1962, José Gregorio, YV5AES, whom we call "Goyo," President of the Radio Club of Venezuela, told of a new DXpedition that was being planned to Aves Island. A list of operators was quickly put together and two days later, all of us met in

[1]Alegrett, L.S., "Aves Island," *CQ*, October, 1956, p. 51.
[2]Weil, D., "*Yasme II* to Aves Island," *QST*, December, 1958, p. 72.

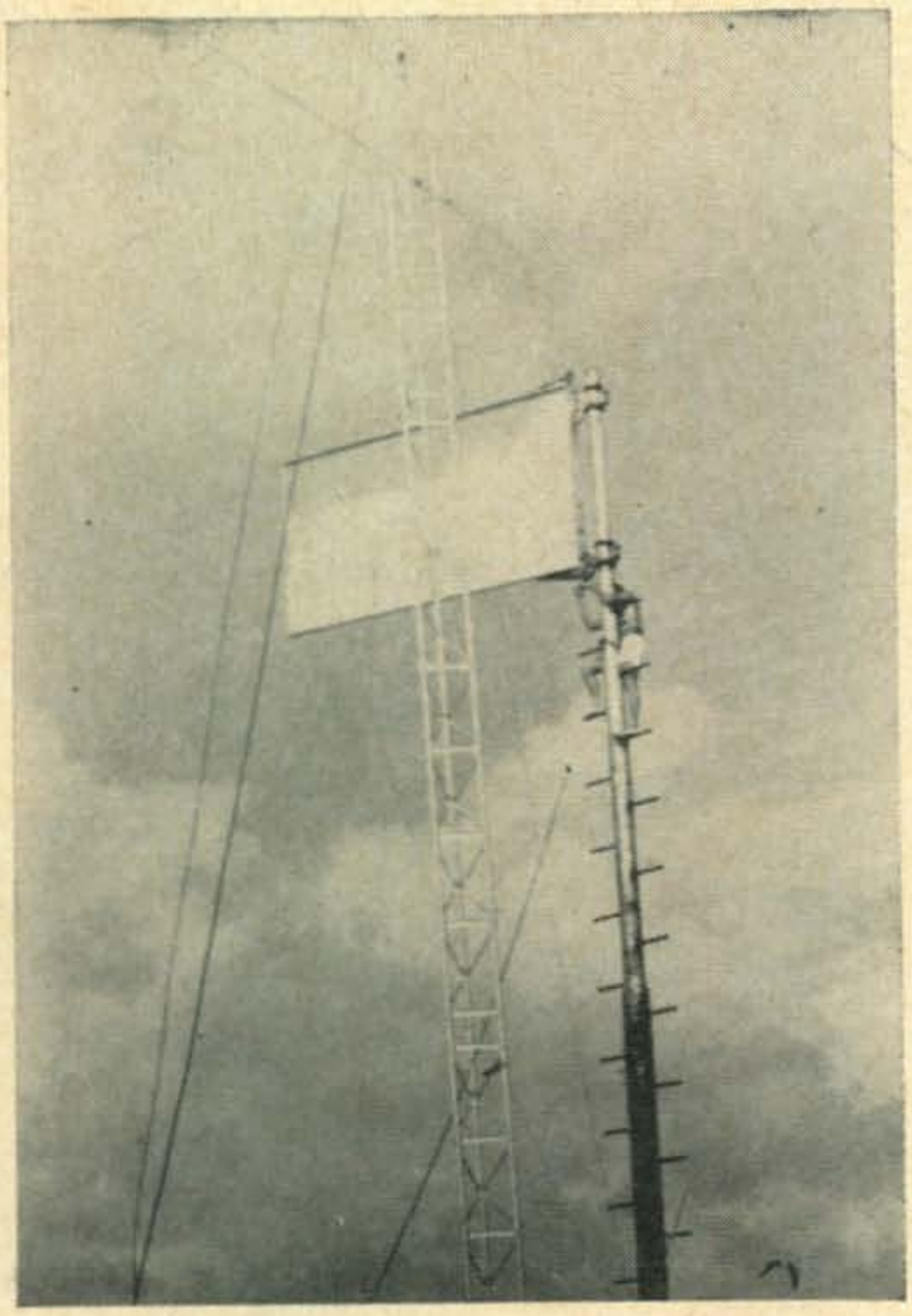
Manning the c.w. rig is Mike, YV5ABZ. Falkenhagen, YV5GO looks on from the rear.



Holding down the s.s.b. chores at YVØAA via a KWM-2 are Tony, YV5AGD and Jose "Goyo" Gregorio, YV5AES. Goyo is President of the Radio Club of Venezuela and was privileged to celebrate his birthday during their two-day stay on the Island.

Caracas and the work started. Goyo was appointed chief of operations. Everything was carefully packed in wooden or steel boxes. Enough gear was to be taken to set up three complete stations. With the equipment prepared for shipment, including an aluminum tower, beams, rotators, spare parts, and power plants, the total weight was about 2,000 pounds and was a little difficult to handle. On January 5th, all the equipment was loaded aboard a big truck and we were off to La Guaira, our main harbor, where the Venezuelan Destroyer *Aragua* was waiting. That afternoon everything was loaded aboard the Destroyer and early on January 6th, 1962, we were on our way.

The Caribbean was beautifully calm that morning but in the evening, as we approached Aves Island it became very rough. The crew of the ship, which was most cooperative during our entire trip, told us not to worry because the next morning all would be calm again. Sure enough, as the sun rose the following morning, Aves Island was in view, directly ahead, and the water was once again very calm. Anxiously, the landing work began. Two small boats were put overboard and all the equipment was moved to shore. Six Marines from the ship also came ashore to help us put up the tents, erect the towers, install the cables, etc. Five hours later, YVØAA was again on the air.



Three Stations

Three separate camps were set up; c.w. on the north end of the island, s.s.b. in the center and a.m. in the south. The c.w. camp was manned by Carlos, YV5FI; Falkenhagen, YV5GO; and Mike, YV5ABZ. The s.s.b. camp was held down by José, YV5AES; Tony YV5-AGD; Louis, YV5BZ and myself. Edmundo "Fatty" Perez, YV5BS; Barbagallo, YV5HL; and Rogelio, YV4EB were to do the honors at the a.m. camp. The c.w. group was the first to start operations and within twenty minutes the a.m. and s.s.b. rigs were also handing out those elusive YVØ contacts. No interaction between stations was noticed! Band conditions were very poor and only a few stateside stations were heard but we all felt happy because YVØAA was once again in operation. Shortly, however, conditions started to improve and everything was going so well that we knew it couldn't last. As we anticipated, trouble came as soon as it got dark. The antenna at the c.w. camp refused to load. One hour later, with the help of a long wire and after a terrific fight with the birds, the c.w. boys were again on the air.

[*Continued on page 116*]

To commemorate the second landing on Aves Island by the Venezuelan Radio Club, this attractive plaque was erected on the only solid piece of real estate located on the island.

During the first expedition in 1956 the Radio Club of Venezuela erected this steel pole holding a metal replica of the Venezuelan Flag. The author is topside connecting an 80 meter doublet. The tower of course is for the 20 meter beam.

A V.H.F. Man's Control Unit

BY RICHARD L. TURNER*, K7MRB

This antenna-switching control unit was specifically designed by the author for those who seek more power than their present transceivers can provide. It allows the receiver section of the transceiver to function normally and permits driving an r.f. power amplifier with no interaction. Extra functions are provided to make this a single-switch installation.

MANY amateurs on the v.h.f. bands are currently using low-power commercial transceivers. There comes a time in every v.h.f. man's life when he wants more "smoke up the stack." This can be accomplished conveniently by the addition of a linear amplifier. However, the problem then arises of how to get the output of the transceiver to the input of the linear and the linear output to the antenna and still use the receiver section of the transceiver on the same antenna.

Circuit Description

Figure 1 is a simplified diagram showing a method of attaining this hookup using an ordinary d.p.d.t. switch. With the switch in the position shown, the antenna is connected to the transceiver input. However, a number of problems exist when using this arrangement.

1—The switch must be placed in the *transmit* position before keying the transmitter or final.

2—The stray capacity between switch contacts and wiring (*C* in fig. 1) may cause feedback and lead to instability or even oscillation.

3—There are too many switches to throw when changing from receive to transmit and back!

The solution, of course, is to use relays in place of the switch. And, while we're at it, let's use the single switch to operate the v.f.o. and transceiver too.

Figure 2 is a schematic of the hookup using relays. The relays used in this installation are surplus d.c. units (don't use a.c. relays) and should have large contacts, preferably silver-plated, to keep r.f. losses at a minimum. If you can't locate relays of this type a couple of Dow-Key or similar coaxial relays, will work as shown in fig. 3.

*3413 SW Raymond St., Seattle 6, Washington.

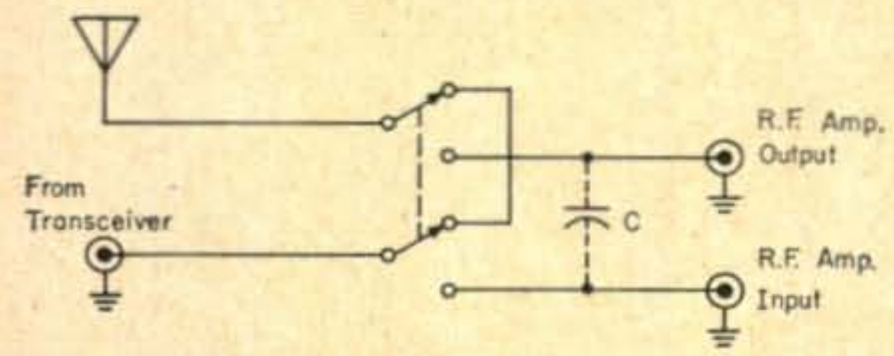


Fig. 1—Diagram illustrating a simple method of using an r.f. power amplifier in conjunction with a transceiver. "C" is the stray capacity develops across the switch. (See text).

Operation

Relays K_1 and K_2 in fig. 2 are the control relays and are mounted in a separate box located at the control position in the shack. Contacts 3 to 6 of relay K_1 are used to operate the transceiver push-to-talk circuit and the v.f.o. If your rig does not have a push-to-talk relay built-in, use contacts 3 and 4 on K_1 to jumper the SEND-RECEIVE switch. Relay K_2 applies 110 volts a.c. primary power to the plate transformer in the final power supply and is energized by K_1.

Relays K_3 and K_4 are the antenna-transfer relays. With K_3 and K_4 de-energized the antenna is connected to the input of the transceiver. When relay K_1 is energized (by placing S_1 in the TRANSMIT position) it energizes relays K_3 and K_4. The output of the transceiver is then connected to the input of the final through contacts on K_3, and the output of the final is connected to the antenna through contacts on K_4.

Relay Power

Power for the relays depends on what type of relays are used and the voltage and current required to operate the coils. Most surplus relays require anywhere from 6 to 28 volts d.c. at 20 to 125 ma. It is left to the builder to

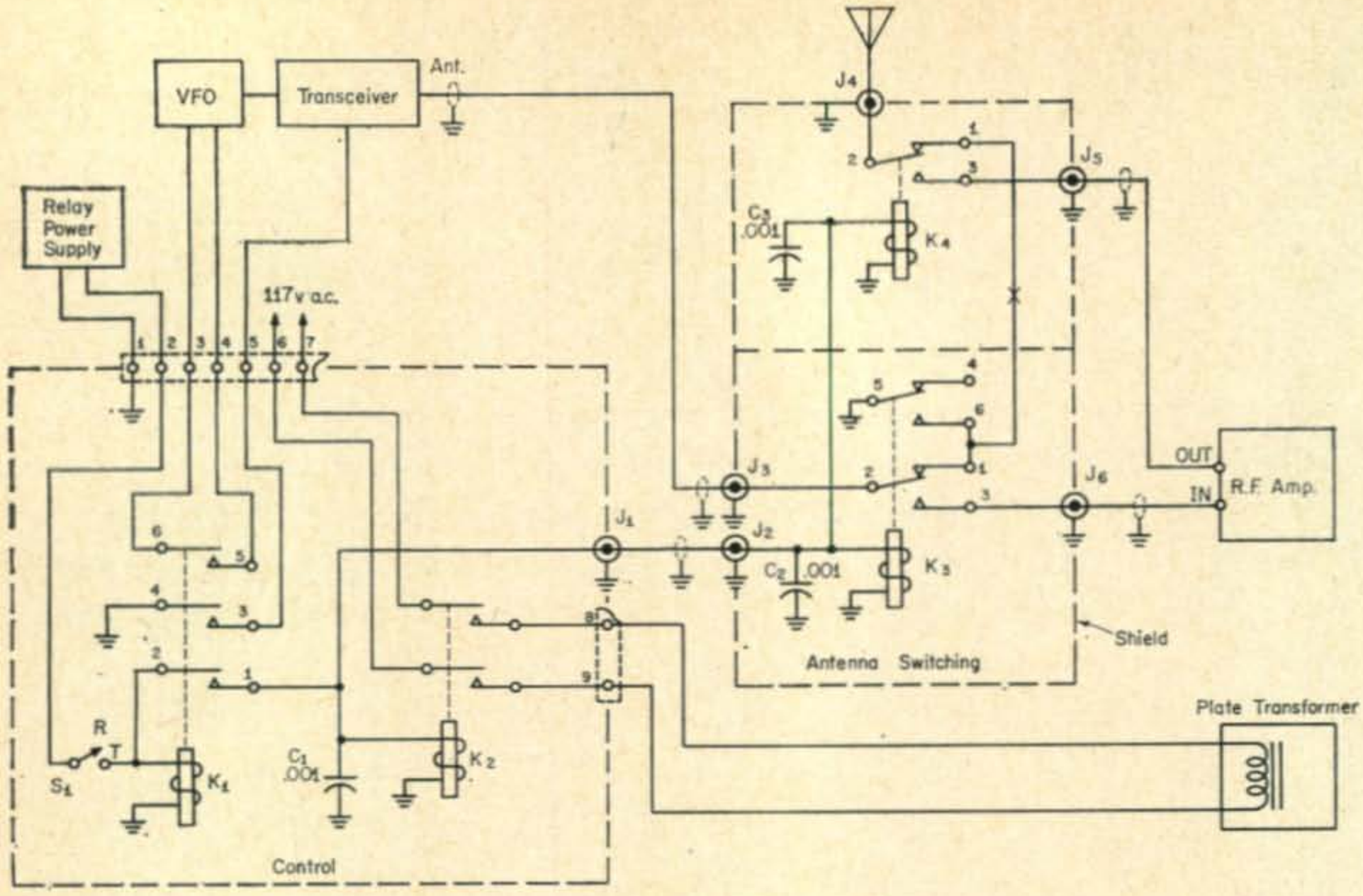


Fig. 2—Diagram of an antenna switching unit designed for the v.h.f. man, capable of one-switch operation of a transceiver with an auxiliary r.f. amplifier. Switch S_1 may be remotely located Operation of v.f.o. and the transceiver itself are also included. All capacitors are .001 mmf disc ceramics. See text for relay information. An r.f. preamp for the receiver can be inserted at point X if desired.

design a suitable power supply, as this is not difficult. Capacitors C_1, C_2 and C_3 are r.f. by-passes. Capacitor C_3 can be replaced with a feed-through type if desired.

Construction

Construction is straightforward, and with a little care, no difficulty should be encountered. The antenna switching unit is constructed in two metal boxes (any convenient size) bolted together, or in a single box with a metal shield between the relays. Solder by-pass capacitor C_2 directly across connector J_2. Run the line from the coil of relay K_4 through a grommet in the shield. Mount a two-lug terminal strip next to the hole to hold C_3. Keep the line from pin 1 on K_4 to pins 1 and 6 on K_3 as short as possible. (For that matter, keep all the leads as short as possible!) The exact mounting of the relays will depend on the type used and is left to the discretion of the builder.

Building the control unit is not at all critical. Any metal box large enough to contain the relays may be used. Mount a barrier terminal strip (or equivalent) on the back of the unit to supply input and output connections. Once again, solder bypass capacitor C_1 directly across coax connector J_1.

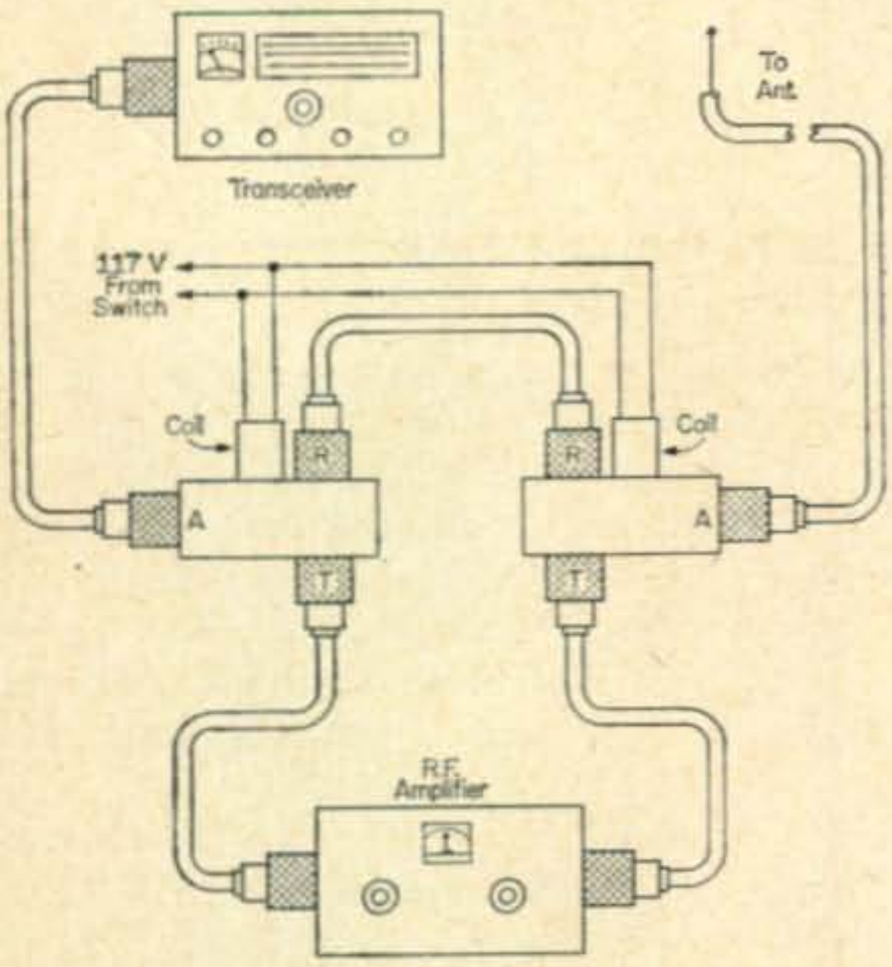


Fig. 3—Relays K_3 and K_4 of the antenna switching unit in fig. 2 may be replaced with coaxial-type relays shown here. In this case, S_1 will require an extra set of contacts for the a.c. power.

Operation

Before connecting the antenna switching unit to the final amplifier and transceiver, check out the unit with an ohmmeter. It is necessary to be sure that in the receive position there is:

A—continuity between J_3 and J_4.

B—an open circuit between J_5 and J_6 and J_3 and J_6. In the transmit position there should be:

C—continuity between J_4 and J_5 and J_3 and J_6.

D—open circuit between J_4 and J_6 and J_3 and J_5.

If you experience any open circuits where you shouldn't, check the relay wiring. The contacts may be gone over with a burnishing tool. If everything checks out connect the transceiver and amplifier to the control unit and give it a try. ■

Results of the

3d Annual CQ 160 Meter C. W. Contest

BY CHARLES M. O'BRIEN*, W2EQS/FP8AS

BACK in 1931, when I was an s.w.l., the 160 meter band intrigued me more than any other. Don't ask me why. It just did. The following year I became a ham myself and assigned the call W2EQS. And, where was my first QSO? Natch! Right there on "Top Band." I don't like to think that that was 30 years ago. A lot of water has passed under the bridge. As I sit before this typewriter and reminisce it was a big, big band. It extended from 1715 kc to 2000 kc. It was loaded with signals with c.w. taking up 1715 to 1800 and phone the remainder. There was plenty of activity on it 24 hours a day. Then we lost some frequencies and the band became 1750 to 2000. Just prior to WW II it was changed to 1800 to 2050 but if memory serves me correctly the war put an end to ham radio before this newest frequency allocation went into effect. The band was still a beehive of activity.

The war came and with it came Loran. Eventually the war ended but Loran is still with us . . . just like the man who came to dinner! The amateurs now had to share the band; certain states are not permitted the use of the band; different power limitations are in effect. Naturally, with these restrictions, there isn't the activity there once was. How can there be when these frequencies are now cut down to two tiny 25 kc segments? Regardless, though, there are many, many, many of us who have still continued to make 160 our favorite stomping grounds. QRM? Sure there's QRM, but nothing like that you'll run into on the other bands. Perfect rag chews can be had. For those of you who have never taken a peek at 160 why not try it out. See for yourselves and learn what you have been missing. We feel sure you'll be amazed. Please keep in mind, too, that ARRL has petitioned the FCC to expand amateur frequencies within this part of the spectrum.

The Annual *CQ* 160 Meter C.W. Contest is a definite fixture to be held each year over the last week-end of February. And, such a whopping success it has been during its three short years of existence!! Unless one heard it with his own ears he wouldn't believe that there could possibly be so much activity—so many stations—crammed into these two 25 kc segments. A grand total of 1,077 stations participated in this event. Every single state that is allowed the use of 160 was represented. This means 44 States (including KH6), 8 Canadian Provinces and DX??? Just look at the DX: FP8, XE, HR, YN, HC, VP9, VP8, EP, HB, OK, G, GI, GD, GM, GW, EI, ZL, GC, ZC and UB. Yes, this is 160—not 15, 20 or 40 meters.

Say, what happened to all the phone boys? It was just like a magician waving his wand. Now you see; now you don't.

Conditions

Here in New Jersey the QRN had been very heavy for two to three weeks prior to the Contest but miraculously disappeared for this event. As early as 2330 GMT Friday, February 23, DHJ, the German commercial station on 1831 kc, was heard faintly, but the path to Europe never did materialize the first night . . . but it did in the northern areas. VE1, VO1 and FP8 were working Europe as early as the very beginning of the Contest. However, signals from South America, Central America, Hawaii and the West Coast of U.S.A. and Canada were very good.

Saturday night and Sunday morning found conditions the opposite. Whereas the path to Europe wasn't too good and the opening brief, there were, nevertheless, signals coming through and being worked. The huge thrill was the appearance of EP2BK who heard quite a few W/VEs but worked only VE1ZZ. (VE1, VO1 and FP8 were again working the Europeans much earlier than any Ws. They were in QSO with them as early as 2330 GMT.) South American and Central American signals were

Yes sir! This is the way it looks up in FP8 land during February. Ned, W1RAN, was there licensed as FP8BX. He gave many their first St. Pierre QSO on Top Band.

*48 Prospect Avenue, Westwood, N.J.

Here's the station at EP2BK. Bob sure had 160 jumping during the contest.

very weak and Hawaii wasn't heard at all. Signals from the West Coast of U.S.A. and Canada were on the weak side until 0900 GMT when they began to build up. By dawn they were booming through and then . . . woomph! Out they went. Never did I notice such suddenness. During this peak period, though, not many East Coasters were able to work them. Was it one-way skip or was there just too much of a QRM curtain from the W8/W9 boys?

The noise level (not static) was very high here during the early morning hours Saturday (was this local or general?) but not noticeable at all during the early morning hours Sunday.

One very interesting oddity noticed by many on the East Coast during the past season is this; when signals are coming through from Europe signals to the South and West are weak or non-existent and vice-versa. And didn't this very same strange phenomenon occur during the Contest!

In 1960, the first year of this Contest, the greatest number of QSOs from any one station was 116; the greatest multiplier was 31. In 1961 it was 223/44 and this year topped that with a 243/48 figure. It was WØNWX who had the 243 QSOs and W3GQF who had the 48 multiplier.

Comments

What would a Contest report be without comments? They're always interesting. So, let's see what the boys had to say . . .

1st DISTRICT

WIBB: Again I want to compliment *CQ* on this Contest which went off very nicely, indeed. Picked up some new 160 meter QSOs and enjoyed the operating very much indeed. W1AW: Congratulations on the very fine Contest. W1WY: With the way this band has been treated, never did I think we'd find this small chunk of the spectrum so cram-jammed as it was over this week end period. W1PH: Fine Contest. Wish I could have given more time to it.

2nd DISTRICT

K2BWR: The Contest sure brought out the c.w. ops in numbers. I never expected to see this much operating within a 25 kc segment of the spectrum Boy what a rat race! Boy what fun! A 25 kc Sweepstakes! Incredible! Thanks to the test I worked 3 new countries bringing the grand total up to 29 worked here on 160. WA2GWS: The Contest was lots of fun and I was sure surprised the way my 50 watts and quarter wave antenna made contacts.

W2DHQ: First Contest for me in 30 years . . . little rusty but fun. W2HUG: Was very surprised to work as much as 500 miles in mid-afternoon. Thought band was good only for local work in full daylight. W2QOS: This Contest was the high point of the year for my hamming. I'm looking forward to next year's already.

3rd DISTRICT

W3KNQ: A wonderful Contest. Please keep it going. W3UMY: Good band but we need more frequency space. Hope to do better next year. W3GJS: And they said it couldn't be done. All those stations in 25 kc. Wow! What a Contest. I loved it all the way. W3GQF: Suggest two weekends next year. W3RFA: This was a fb Contest and I hope to enter with a better antenna next year. (THERE'S PLENTY OF TIME TO GET A BETTER ONE UP, OM.)

4th DISTRICT

W4OMW: I enjoyed Contest even more than last year, especially since I added three new countries to my top-band score . . . VP9 XE KH6. Looking forward to next year's fracas already. K4KYV: I had been looking forward to working in this Contest for 2 years but this is the first time I have had a rig running on 160 at the time. Worked Wyoming which I have been trying to get for years on the shorter wavelengths for WAS. Need only Alaska now. Too bad they can't work 160—hi! As a rule I dislike contests but this one is really enjoyable. Thanks for getting it going. Am looking forward to next year. K4HQK/4: A very noted increase in activity this year. However, due to a very faulty 80 meter doublet my score isn't nearly as good as last year's. If Florida is ever opened to 160 I'll be on from there in future Contests. Let's hope ARRL's petition goes through! (John was in So. Carolina. That's pretty rare on any band.)

5th DISTRICT

W5DWB: Sure enjoyed it. Keep up the good work. How can so many stations fit into so few kilocycles? W5TLY: This, I think, is a *real* Contest and I am already prepared for next year. Read these stations . . . KH6IJ, XE1OK, HC1AGI.

6th DISTRICT

K6TSQ: Had much fun. Next Contest hope to have a much better 160 antenna rigged and a better score. Looking forward to next one! K6PJY (other operators WA6s GJW IJH IJG): This was the first time any of us have had any experience on 160 meters. We were all amazed at the amount of activity on the band. We were also quite happy with the results of our quickly thrown together rig. It was started Friday night and completed Saturday afternoon. Look out for next year- We're going to be in there to win! It looks like a great band. Let's get more activity on it. I am also in favor of getting back *all* the band from 1.8 to 2.0 mc. I would like to see more articles on 160 meter rigs, antennas, etc. WA6CDR: The Contest was very much of a ball and I sure hope to have a bit

better receiving set-up for next year. No Loran or noise limiting gear here other than a loop. W6GWQ: One of the cleanest, most enjoyable Contests I've entered. My hat is off to the many fb ops participating. See you again next year.

7th DISTRICT

W7ZVY: Band conditions from Washington as good as last year but the boys from California didn't mind. They are sure hard to compete with!

K7OEP: This is the first Contest I have been in and I enjoyed it a lot.

8th DISTRICT

W8WFB: This Contest marked my first venture to 160 meters and I did enjoy it very much. My Dad, W8BKP, told me after Contest that on his old NC1O1X he heard 3 different G and several W6 call me but I never heard them, *@ø$#!! Next year I will be more prepared as I found I like the band and will be operating there often from now on. Thanks for a fine Contest and I'll be seeing you next year. K8RNM (Tusco Radio Club): Your first article about the 160 meter Contest was a real shot in the arm as far as our club was concerned. We have never before entered a 160 Contest so discussed this subject at one of our meetings and agreed that the club should enter. In raising the antenna one of the fellows remarked, "It is so long that we should be able to work half way around the world because the antenna is about that long." It was a very enjoyable affair and we hope to enter again next year.

9th DISTRICT

W9PNE: Conditions were fair to poor. It was a real thrill to hear the tremendous activity and work many old friends again. Wish I could have spent more time in Contest but a combination of equipment trouble and poor health slowed me down. (It is the hope of all of us, Brice, that your return to good health will be very soon. Brice is one of the leading DX men on the band with 35 countries worked on 5 continents.) W9LFK: There being two contest on this week-end (160 Meter and RTTY Sweepstakes) I am sorry I couldn't do justice to both so shared my time and spent a few hours at each. W9CLH: Had good time again this year. Heard some good DX but was able to come up only with HR3HH. But that is a new country for me. Band was in good shape and sure sounded like 40 meter c.w. during Sweepstakes.

10th DISTRICT

WØNWX: Congrats on your idea several years ago for the 160 Contest and thanks for all the hard work you have put into the deal from all of us who enjoy it so much. This Contest has done a lot to increase activity on 160. This is certainly a honey of a Contest. I think the set-up you have figured out for 2, 5 and 10 point contacts is a very wise one. I would favor one change, though, in the rules. Make it a 24 hour affair. (May we have your comments on this, fellows? *Ed.*) KØQCQ: I really enjoy this Contest. Thanks. WØCDP: Conditions were excellent. Plenty of good contest type operators. Still wish the 1.8 boys would spend more time listening on the top end. Sure would think they could use the multipliers. A real fun Contest. Enjoyed every minute of the 17 hours I put in.

CANADA

VE1JX: This was my first attempt in a contest so I may have made some mistakes. I also had to work both days so my score could have been much better. VO1FB: Conditions seemed quite good and although I worked several new ones, my my biggest thrill was hearing EP2BK at 2210Z on 24 Feb. at RST 569. Also heard a UB5 later on (this was UB5WF—*Ed.*). Thanks for an interesting week-end. VO1DX: It was great fun and we captured two new countries—FP8 and EI. Conditions went exactly the same as last year. We heard and called you Ws on Friday night but few takes. On Saturday night we called a few CQs and then had a hard time keeping up with the Ws calling us. Sure appreciate this Contest. VE3QU: Enjoyed Contest. Suggest stations calling CQ cross-segment, announce listening frequency. Helps a lot.

Hal Holler, HR3HH, at the rig that gave many of us a new 160 meter country. If you didn't get him this year cheer up as he'll be back on the band again next season.

DX DX DX DX DX

EP2BK: I really enjoyed this Top Band Contest even though my remote location precluded my making many contacts or piling up a good score. Conditions seemed to be very favorable. The band went red hot for about 15 minutes right after dawn here, around 0305 GMT. FP8BX (who is none other than W1RAN): Could have worked many more if they had tuned above 1825 kc. I noted my signals built up fairly late and the ones I was able to work late in the evening gave good reports. This is why I think Ws didn't tune out of band enough. HC1AGI (W3EIS): I called ten W/VEs for each one I worked. And here I had a 300' antenna 2 miles up in the air with 300 watts being pumped into it. Either the boys didn't turn up their gain or they failed to listen outside their portion of band. I could hear you boys in both sectors as early as 0100 GMT. Conditions here were the best since I arrived. So far I have yet to hear my first European (Don finally made it with G6BQ on March 11), but I did work all U. S. call areas at least during Contest. HR3HH: I erred by thinking only one night of operation was allowed. Therefore, I missed Friday night completely. Not having worked c.w. for some years I wore out about 0900 GMT and couldn't pump the key any longer. Have since put the bug back into operation. Some of my observations: I called CQ-West and also CQ-2 mc continuously for about one hour but only received about 3 calls. They just weren't listening. I moved to various frequencies also trying to attract their attention. Therefore, a lot of the West Coast boys missed me. I tried to interest several other Central Americans but didn't quite get them out. Maybe next year. (Keep after 'em, Hal—*Ed.*) Good luck and congratulations to all of you for your perseverance on this band. It is quite a challenge.

KH6EOF: Know I didn't win the KH6 section but sure had fun. First time I've been on 160. W6HRG, WA6CDR and K6HXT had good signals here at all times. Too bad I could work 'em only once. Heard two other KH6 stations . . . IJ and DVD. KH6DVB: For what value it may have am enclosing a recap of my humble results. Was limited in time even for participation and the "big" 400 foot long wire came down shortly before the Contest. So my log looks like (and amounts to) token activity—hi! The "*CQ*-160" is a real f.b. affair—one of my favorites. Keep 'em coming and I'll try to hold up my end a little better next time.

XE2OK: I'm very glad to enclose my log covering the 3d Annual *CQ* 160-Meter World-Wide Contest. I couldn't be more active due to my handling ship's traffic in the harbor (Santa Rosalia, Baja, California) which kept me very busy. At the times I was on the band conditions didn't help me at all. Terrific QRN in 1.8 mc due to Loran stations and very bad phone QRM in the 1.9 section. I had a great deal of pleasure working the boys on 160 and will be looking for next season in which I hope I can have better luck. Congratulations on your f.b. idea about this Contest and sure I will be very active on the band in the future. . . .

G3OLN: I thoroughly enjoyed the Contest and am looking forward to next. Haven't yet worked across the pond but am hearing Ws pretty constantly. Some interesting DX heard during Contest were WØVEH/VP9, VP8GQ (South Orkneys), FP8BX, EP2BK and UB5WF. G3IGW: Thanks for a Contest which I found most exciting although I wish conditions to U.S.A. had been as good as the path to Persia and Cyprus! Given luck, next time maybe, one of the Gs may even win! G3OHM: FB Contest. Very enjoyable. Gondx not vy gd for Stateside, though. G5JU: I am very sorry no W/K stations appear in the log. I heard several but they were pretty weak and they couldn't hear me. It was bedlam trying to work DX on the morning of the 25th. Dozens of Gs were working all over the American sector making it difficult to hear the DX and find out if it was coming back. VP8GQ was on. I heard him weakly around 1801 kcs. but hopeless to try and work him. VE3BQL/SU wanted to be on in the Contest but unfortunately was away in Cairo that week-end. I enjoyed the Contest and lost more sleep than usual whilst it was on. Imagine it proves very popular and look forward to the next one. GI6TK: Due to a fault that developed a few minutes after the Contest started I was able to operate only a few hours. Since I am a blind operator I was unable to rectify the fault until help arrived on the Saturday afternoon. (Our sincere thanks to a mighty fine fellow by the name of W. Dougan, GI-7535 who prepared Frank's log, listed comments and saw to it that everything was in order. This is one of the 'little' things that makes ham radio the wonderful hobby it is—*Ed*). GW8PG: An excellent Contest. Same again next year, *please*.

EI9J: A couple of weeks before your Contest both W2IU and W4KFC asked me to come on during it. At that time I had no final though could work into G with the v.f.o. with an input of about 1.5 watts. Well, to satisfy them and also to hope to work a couple of others who had asked me to try to get on Top Band so that they could work EI . . . Well, I lashed up a final and came up. Great pity that the second morning clashed with the RSGB Contest because those boys were on in layers and most of them ignored the emphasis that I put on CQ DX. On Saturday morning you chaps were so busy working yourselves that I was a voice in the wilderness. WØVEH/VP9 was seemingly only interested in working the States. He had a good signal here. Well, next year I intend to show up again. Try and see that it does not coincide with any other Contest on the band.

W3GQF, The Johns Hopkins University Radio Club Station, with Dick Chambers, W3WZL, behind the key. Dick was the second highest scoring station in the world and had a multiplier of 48—second to none.

Recap

Well, gang, there you are. It was, once again, a most successful and thoroughly enjoyed Contest as you can readily see from the remarks given. However, some suggestions are in order. 1) Short calls, please. 2) Remember there are two segments to 160. Don't tune to just your own but rather keep an ear tuned, at least occasionally, to the other. 3) Keep your ears tuned to frequencies other than those allotted to us for DX calls. Most DX stations can operate anywhere between 1800 and 2000 kc (more on this to follow). 4) District of Columbia counts the same as Maryland as far as a multiplier. It is either/or—not both.

It is difficult to give hard and fast rules about that which is to follow. East Coast Loran operates on 1950 kc; West Coast Loran, on 1850 kc. These are megowatt or more signals and spread horribly. Their QRM is worse than the "bubonic plague." For those of you permitted the use only of 1800-1825 kc, if you want to work stations restricted to the 1975-2000 kc segment you must transmit between 1800-1805 kc. Conversely, for those of you restricted to the 1975-2000 kc segment, if you want to work the stations restricted to 1800-1825 kc, you must transmit between 1995-2000 kc. This is approximate but, over-all, we believe you will find it to be the best.

DX STATIONS: To work East Coast operate from 1825 to 1830 kc. To work Central USA operate between 1800-1805 or 1995-2000 kc. To work West Coast operate from 1970-2000 kc. Re KH6: East Coast work between 1800-1805 kc. KH6 work between 1995-2000 kc.

What's sauce for the goose isn't always sauce for the gander. In other words, the above might be satisfactory for most but not all. You have

to experiment to find out the best frequency for you to operate in order to work a given area.

DISQUALIFICATION: We are, indeed, sorry to have found the need to reject the score of one station for deliberately giving false numbers. Rules are rules. They are made to be adhered to. No one else but the violator suffers.

And so it goes. By the time you read this attractive certificates will already have been sent to the leading station in every state, province and foreign country. See you again in 1963.

Here's an old regular on the 160 meter band . . . K8HBR. Watcha doing with that mike, Al? This was a c.w. only Contest!

Remember, it's a fixture for the last week-end in February. ■

Top Ten—East

WØNWX	23,670	W9YT	15,456
W3GQF	22,176	W2UWD	13,494
W4KFC	21,888	W2EQS	13,024
W2FYT	18,748	K8HBR	12,464
W8HGW	15,752	KØPAU	12,320

Top Ten—West

WØCDP	15,750	WA6CDR	9,044
W5DWB	14,022	WØSDN	6,732
KH6IJ	13,832	W7UBI	5,974
W6KIP	13,692	W6YC	4,850
K6HXT	11,470	K7ICW	4,536

The first column is the number of contacts, second is the multiplier, third is the number of countries worked, and the last column is the final score.

Connecticut

W1TX	129	35	7	10,430
W1WY	36	20	3	1600
W1TVN	15	11	3	418
W1AW	15	8	2	240

Massachusetts

W1BB	139	36	9	12,024
W1ME	107	34	7	8636
W1AQE	89	25	4	4850
W1PH	42	18	2	1512
W1LMU	12	9	2	216

New Hampshire

W1FZ	65	23	3	3174

Rhode Island

W1PPN	141	36	7	11,880

Vermont

W1RWP	107	28	3	6216

New Jersey

W2FYT	186	43	10	18,748
W2EQS	160	37	6	13,024
K2BWR	107	32	7	8128
W2IU	102	31	5	7290
W2HUG	120	28	4	7168
W2ODY	72	21	3	3192
W2CVW	73	21	2	3066
W2UKS	52	19	3	2166
W2ZI	49	19	2	1862
K2AZJ	3	3	1	18

New York

W2UWD	157	39	6	13,494
W2OOS	122	31	3	7874
W2FBS	80	24	4	4224
W2SSC	75	20	2	3000
WA2GWS	53	21	2	2226
W2DHQ	50	19	3	2052

Maryland

W3GQF	199	48	10	22,176
W3WV	156	31	4	10,168
W3EIV	102	32	5	7168
W3FYS	78	26	4	4472
W3RFA	65	26	5	4004
W3BKE	24	13	2	624

Pennsylvania

W3GJS	123	27	2	6642
W3IDO	57	22	2	2508
W3KNQ	38	16	2	1216
W3UMY	39	13	2	1014

Kentucky

W4OMW	111	35	5	8540

North Carolina

W4EFE	52	20	3	2240

South Carolina

K4HQK/4	28	13	2	728

Tennessee

K4KYV	123	33	2	8118
W4SQE	65	30	4	4380
W4HYY	68	25	2	3400

Virginia

W4KFC	205	46	14	21,888

New Mexico

W5DWB	147	41	6	14,022

Texas

W5TLY	41	20	2	1640

California

W6KIP	131	42	6	13,692
K6HXT	127	37	6	11,470
WA6CDR	109	34	5	9044
W6YC	81	25	4	4850
WA6JPQ	64	26	5	3900
K6PJY	68	24	4	3840
W6GWQ	70	23	4	3772
W6AMO	67	24	4	3600
K6KIN	60	21	4	2856
W6BB	52	18	3	2016
K6TSQ	41	13	4	1378
W6OST	42	12	2	1008
K6LEP	30	9	3	684
W6JAI	25	9	3	522

Arizona

W7ENA	31	14	2	868

Idaho

W7UBI	87	29	5	5974

Montana

W7JLD	40	25	2	2000

Nevada

K7ICW	73	28	4	4536

Oregon

W7LNG	56	23	4	3128
K7HDB	44	16	3	1536

Utah

K7OEP	30	11	2	748

Washington

W7ZVY	72	26	3	4316
W7JC	38	12	3	1008

Ohio

W8HGW	159	44	7	15,752
K8HBR	152	38	5	12,464
W8QWI	118	30	4	7560
K8RNM	103	27	2	5562
W8YPT	75	27	3	4266
W8GDQ	45	29	4	3306
W8WFB	57	22	2	2508
W8NWR	69	17	2	2346

Michigan

W8OFG	115	26	2	5980
K8QDZ	101	22	3	4620

Illinois

W9PNE	105	38	4	8588
W9CLH	118	32	3	7808
W9QQG	100	26	2	5200
W9MAK	73	25	3	3850
W9YYG	72	23	2	3312

Wisconsin

W9OKN	172	42	5	15,456
W9LSV	96	26	2	4992
W9LFK	10	10	2	200

Colorado

WØCDP	163	45	5	15,750
WØETT	53	24	3	2736

Iowa

WØNWX	243	45	7	23,670
WØGIT	125	35	5	9590
WØNFL	30	11	1	660

Minnesota

KØPAU	138	40	5	12,320
WØRHI	93	32	2	5952

Missouri

WØGBV	100	34	4	7344
KØQCQ	35	15	2	1050
WØUXQ	28	17	2	952

Nebraska

WØBBS	58	26	2	3016

North Dakota

WØSDN	94	33	4	6732

Newfoundland

VO1FB	47	22	9	4356
VO1DX	22	15	5	1140

Nova Scotia

VE1JX	76	23	5	4830

Quebec

VE2AYY	152	35	6	11,760
VE2IL	29	11	2	638

Ontario

WØAIH/VE3	127	32	3	8384
VE3BWY	118	28	4	7056
VE3QU	82	28	3	4816
VE3DU	72	28	2	4052
VE3AGX	64	25	2	3200

Alberta

VE6WW	22	9	2	387

British Columbia

VE7AFW	29	12	3	792

Iran

EP2BK	11	5	5	300

St. Pierre Et Miquelon

FP8BX	44	15	4	6000

Ecuador

HC1AGI	39	26	6	9620

Honduras

HR3HH	40	18	4	6966

Hawaii

KH6IJ	55	26	5	13,832
KH6EOF	19	6	3	1044

Bermuda

WØVEH/VP9	64	22	2	14,080

England

G3IGW	235	16	13	9136
G3CHN	113	18	13	6372
G5JU	144	12	11	4188
G8NF	177	9	9	3519
G3OLN	165	8	8	3280
G3NIS	140	8	8	2648
G3OHM	86	6	6	1248
G3PDM	72	6	6	1116

North Ireland

GI6TK	56	10	9	2810

Wales

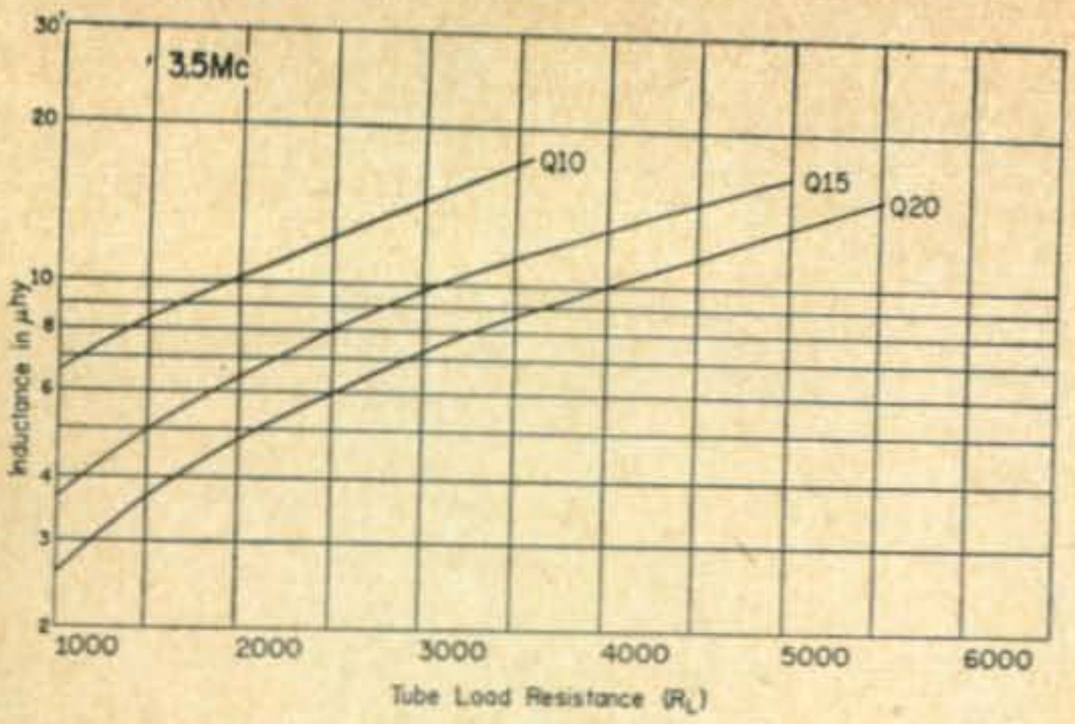
GW8PG	59	7	7	1988

Eire

EI9J	37	17	8	4760

Mexico

XE2OK	25	12	1	3000
XE1OK	25	12	3	2880



Practical Pi-Network Design Data

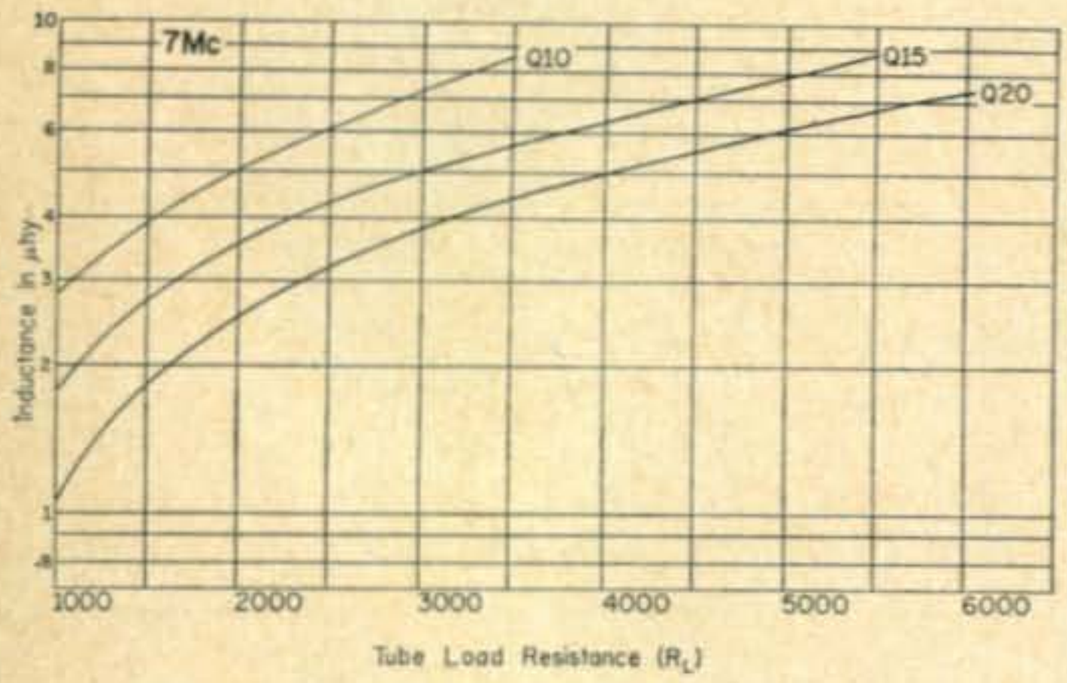
BY E. H. MARRINER*, W6BLZ

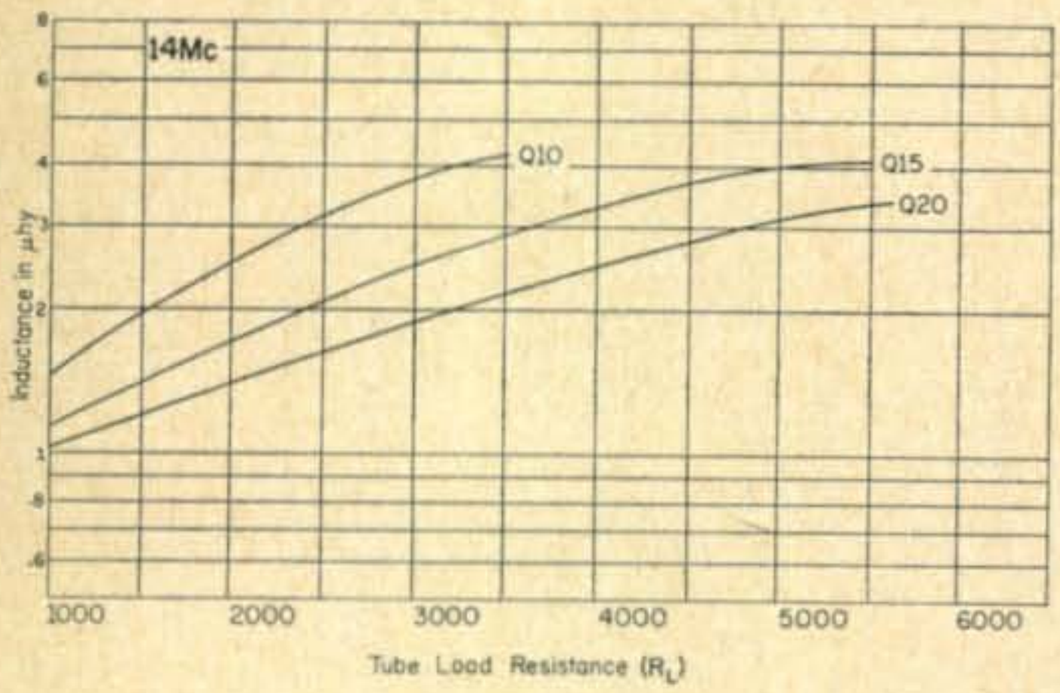
MANY modern transmitters use a pi-network tank because it can conveniently match most low impedance lines. Most frequently it feeds a 52 ohm line.

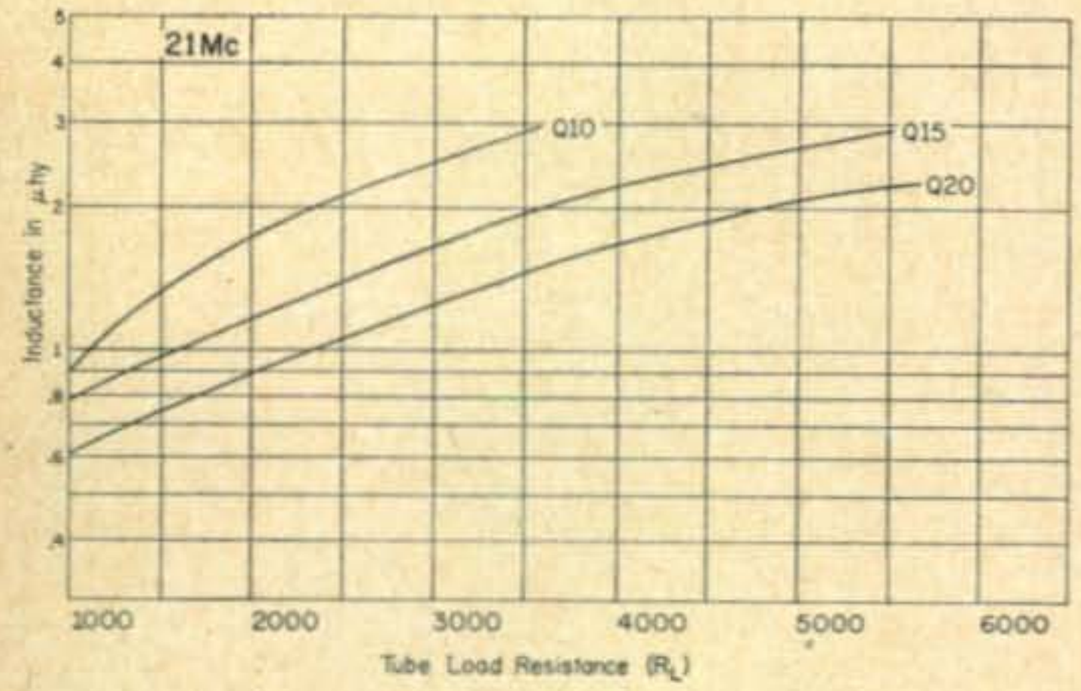
Experimentors, building transmitters using various output tubes, find it difficult to calculate the values of the pi-network components. To make the task simpler, a series of graphs have been constructed so that the components can be determined in inductance and capacitance values directly, rather than reactance values given in most reference texts.

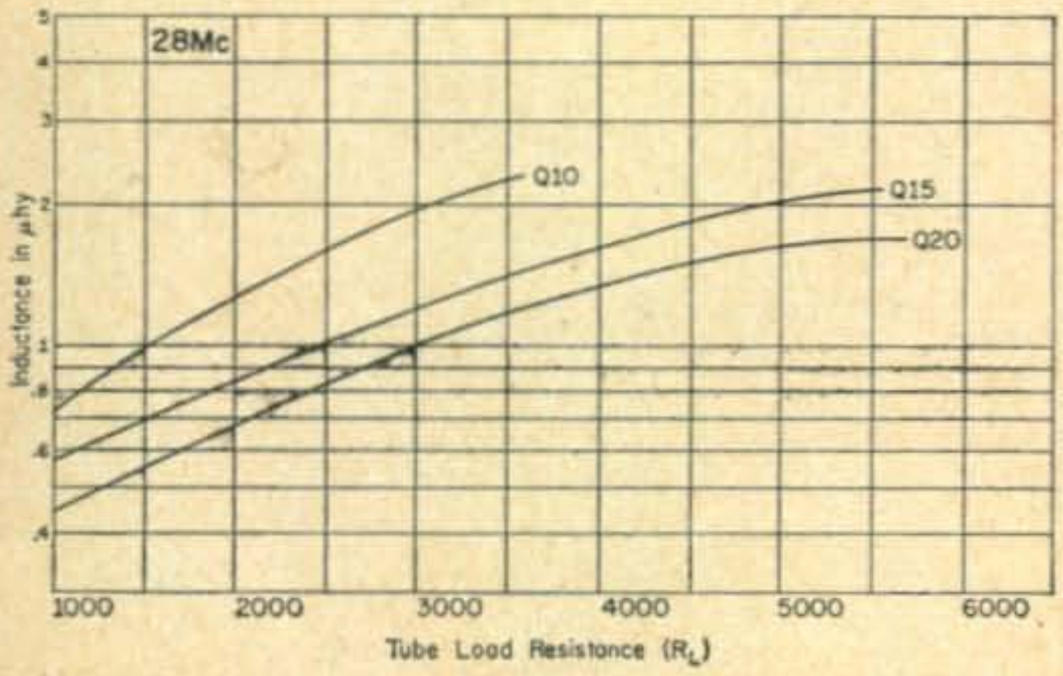
A set of curves is provided for each amateur band and are calculated for the lowest frequency used in that band. The curves are based on a 52 ohm output which is most commonly used. Two sets of curves are provided for each band, one for the inductance value and one for the capacitance values. The graphs are constructed for three values of Q; 10, 15 and 20.

A high Q tank circuit provides excellent harmonic attenuation but reduced efficiency while a low Q tank circuit gives little harmonic attenuation but higher efficiency. A value of Q should be chosen that provides a compromise and a suitable value would be 15. This would be best since it would help eliminate harmonics and still provide a reasonable tank efficiency.









How To Use The Graphs

Before using the curves it is necessary to determine the plate load resistance of the output tube feeding the network. If, for example, a 6AG7 is used with 300 volts applied and a plate current of 30 ma results, the following formula would enable determination of the plate load resistance.

$$R_L = \frac{E_P}{I_P} \times 500 \text{ or}$$

$$R_L = \frac{300}{30} \times 500 = 5000\ \Omega$$

*528 Colima Street, La Jolla, California.

The required inductance value for a pi-network on bands 80 through 10 may be determined from this set of curves. The curves are based on an output impedance of 52 ohms. For a 72 ohm load the values may be increased approximately 3 per cent.

The problem of designing a pi-network output circuit for a transmitter is a thorny one for many amateurs. The author has removed the need for all but the simplest calculations and has boiled the entire process down to a series of graphs.

where:

R_L = Plate load resistance.
E_P = Plate voltage under load.
I_P = Plate current under load.

If two tubes are paralleled in the output, the value would be divided by two.

Having decided upon the band, the Q and with the plate load resistance known, we are ready to consult the graphs. For a Q of 15 and a plate load resistance of 5000 ohms in the 3.5 mc band we consult the appropriate inductance graph:

Scan the bottom of the inductance graph until you locate 5000 ohms. Now follow the line vertically until it intersects the selected Q value (in this case, 15). The intersect point indicates a required inductance of 16 microhenries. The same procedure is followed to determine the capacitance values.

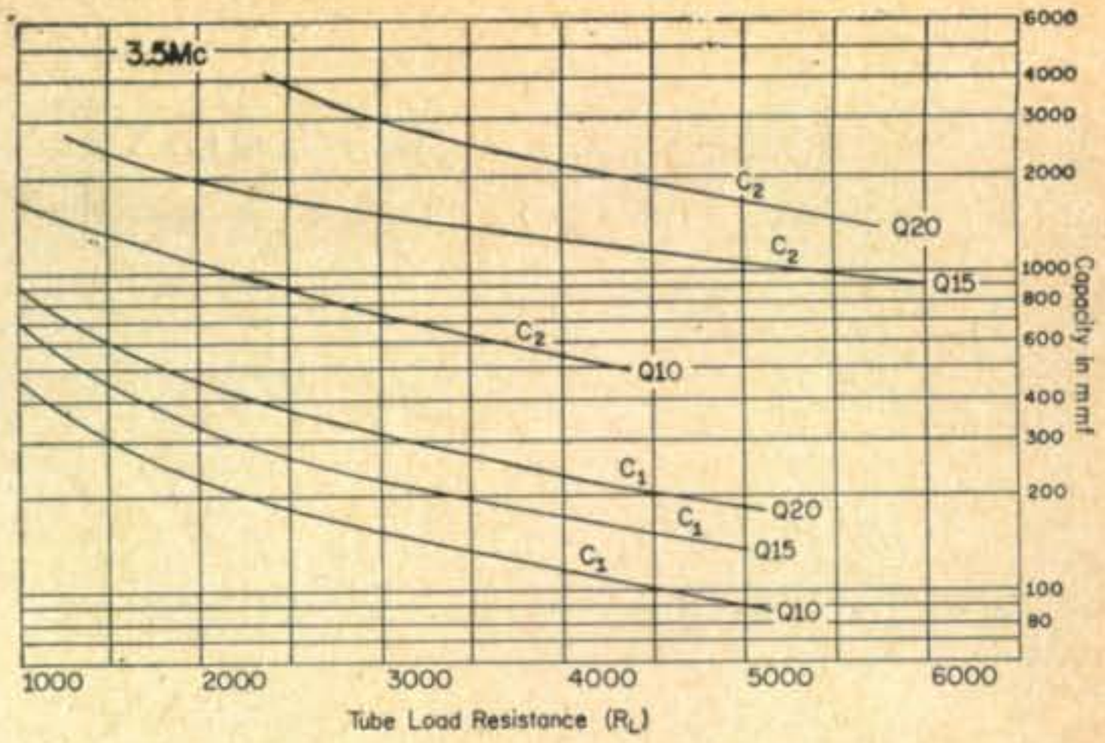
Acquiring The Inductance Value

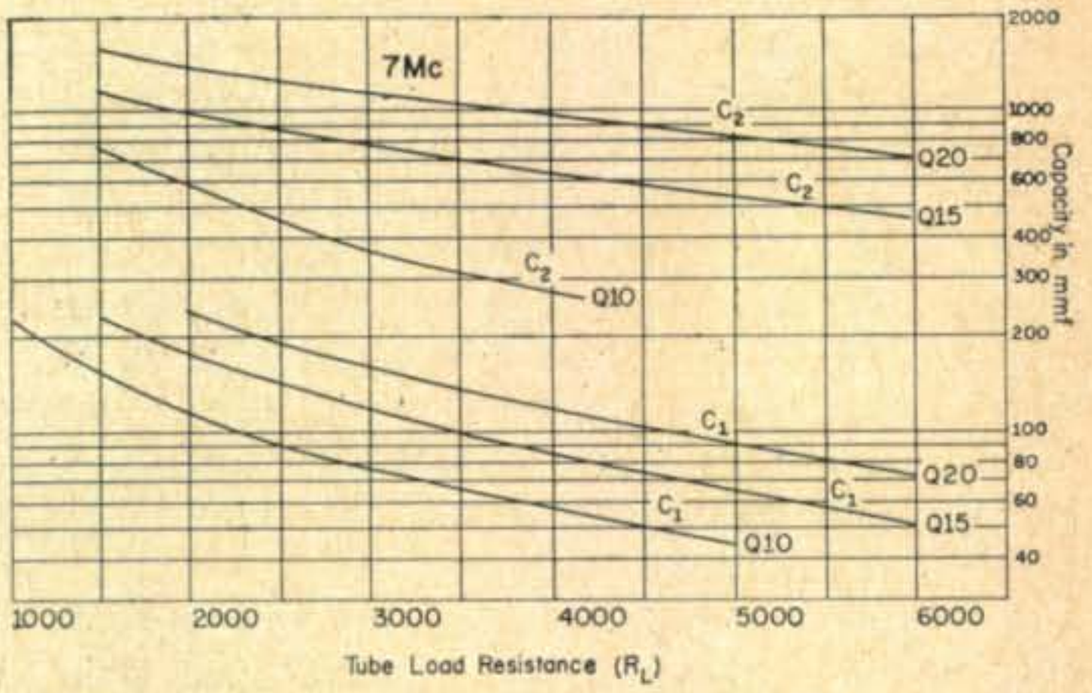
Now that a value of 16 microhenries has been determined, how may we convert this into an actual coil? Since most amateurs do not have an inductance bridge one of the following methods may be employed.

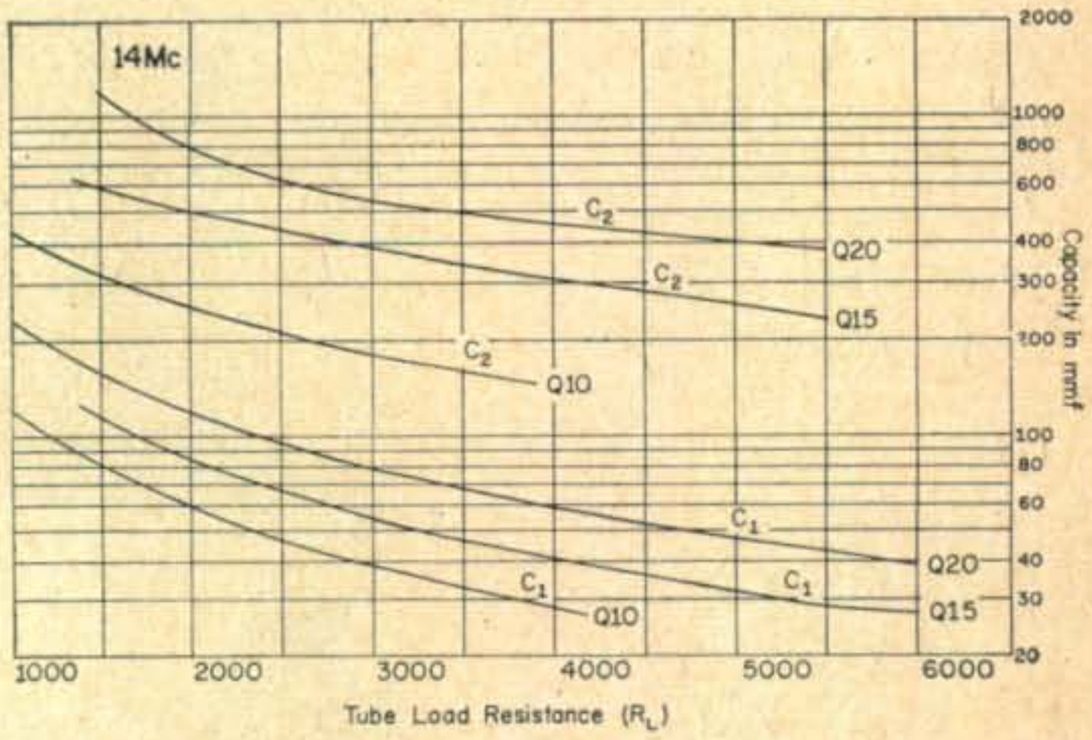
Set the values of C_1 and C_2 in the transmitter tank assembly to the values indicated by the curves. Connect a 52 ohm non-inductive resistor across the output. Place the coil stock in the circuit and short out turns until resonance is indicated. If a roller type coil is used rotate it for a resonance indication.

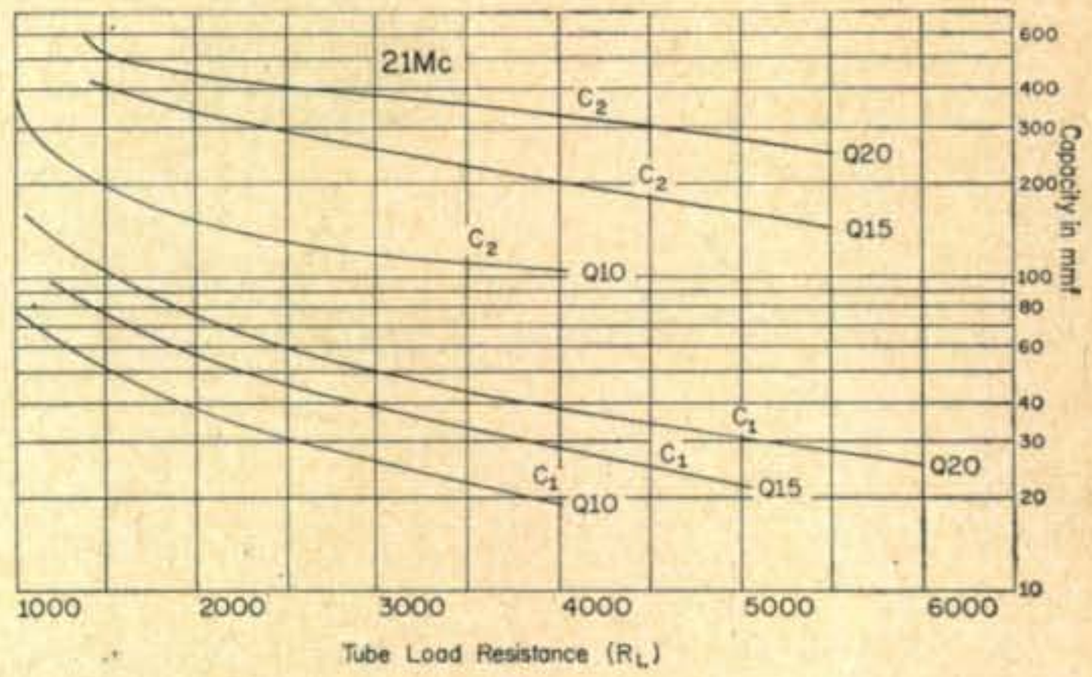
Pi-networks can also be tuned by reading the r.f. voltage across each capacitor, tuning the coil for maximum.

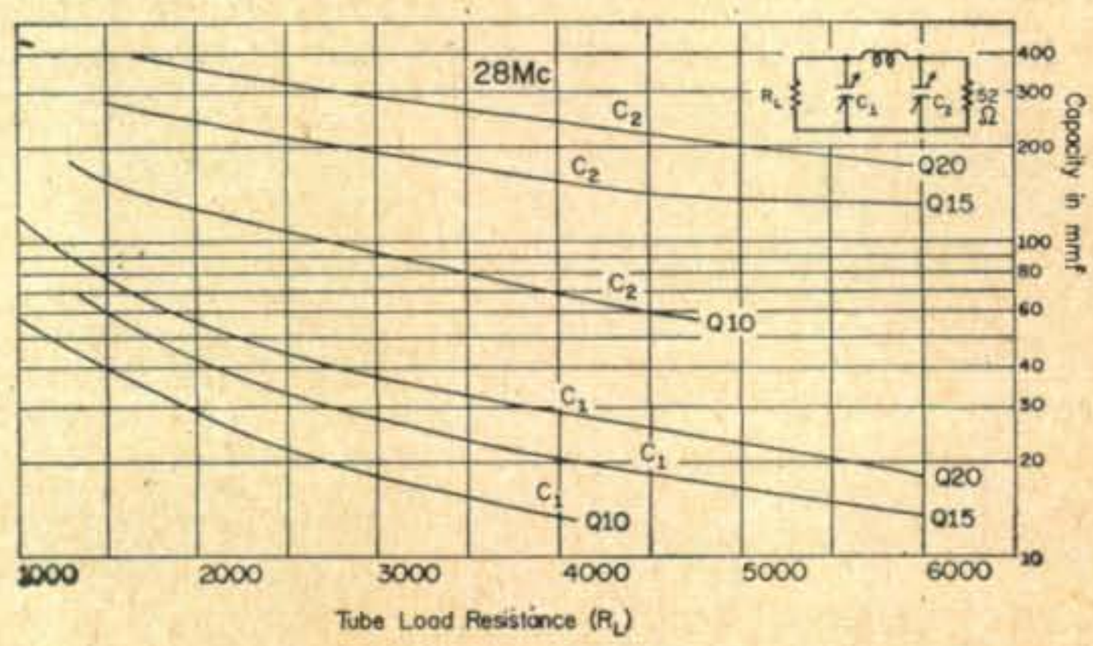
Another approach is to use Air-Dux bulk coil stock. Illumitronic Engineering Co., Sunnyvale, California provides an Inductance Calculator (#2) that will show the exact number of turns versus inductance for their complete line of bulk coils. ■











The required capacitance values C_1 and C_2 for a pi-network may be determined from this set of curves. The curves are based on an output impedance of 52 ohms. For a 72 ohm load the values may be increased approximately 3 per cent.

ONE KNOB MADNESS

BY J. WORTHINGTON*, G3COI

WAY back in '48 when I had just got my ticket, I was quite happy to roll along with a switch in every circuit in the rig. Of course in the early days the rig was simple and after all there aren't many switches you can fit on a CO/PA (crystal oscillator, power amplifier), two tube outfit anyhow. But nevertheless, I managed to use quite a few and going over from transmit to receive was always quite an event. I am no ace constructor of gear but I noticed that even my friends stuck to their antiquated switchery so I thought it was normal. Until at last the insidious magazine articles with that fancy control business began to exert pressure on me.

The printed word and diagram was not the only influence because as I started to make more fone contacts (my first rig was c.w. only —obligatory in the U.K. in '48 for the first year of license) it became clear that I was an object of disdainful jocosity. When the other fellow went over to receive, before doing so he would say "I'll give you a minute or two to make the change. . . ."

... DISDAINFUL JOCOSITY...

The idea of being able to go over using one knob only did in fact attract me and for some time I worked full break in on c.w. by the simple expedient of fitting a random wire antenna to the RX and keying the h.t. to the v.f.o., clamping the p.a. of course. Mind you, this created a heck of a row during a contact. I never use cans so that to read the other man the gain had to be kept up and when I was transmitting the shack resounded with the bellowing of my 25 watter.

So I decided to get involved in One Knobbery and set out to build me a new rig with high power, 150 watts (the limit for a G) and all modern conveniences. To save time (!) I bought myself the p.a. and modulator ready made. To save frustration I also bought the v.f.o. Now let's see, what did I have to build—yes, the power pack I think. Well, that was quite a job you know, especially with all that switchery. I purchased the switches very carefully after long consideration and many diagrams. I spent hours doing those sketches and it was almost with relief that I started on the actual job of hacking holes in the magnificent steel box that I had searched all over the midlands of the UK to find.

Well, I finished the job in double quick time, and had some real fun with that rig. . . . "What did you say the handle was OM? break! . . . Oh! that's unusual, did you say Arbuthnot? break! . . . bet you don't work much c.w. . . ." Until one day the v.f.o. blinked, and on starting to tear things apart I found I had lost the drawing of the switch circuits.

...THE BIGGER THE BETTER...

It took me nearly a month to trace everything out and I wore out two sets of leads on my ohm-meter before I had that rig back on the air. That finished me as regards one knobbery and I shall never look back. Give me plenty of knobs to bash at—the bigger the better. Needless to say, the next rig I built incorporated about twelve, they stood out all over the thing like a rare tropical disease. When I went from transmit to receive or vice versa it sounded like Fred Astaire doing a work out. And none of them were marked with their functions either, so it was real clever stuff. Then

[*Continued on page 104*]

*43 Mount Road, Penn, Wolverhampton, Staffs., England.

32S-I Operating Improvements

BY P. C. KREAGER*, W6UYW and M. H. GONSIOR†, W6VFR

The authors outline a series of modifications for the 32S-1 that leave intact all the operating features of the equipment and that do not require any physical changes that would mar the appearances. The modifications provide improved c.w. performance; a variable keying time constant circuit and other improvements beneficial to the other modes of operation.

THE Collins S-Line equipment makes amateur communications a genuine operating pleasure, since, with the receiver and transmitter connected for transceive, s.s.b. operation is near its ultimate. The equipment performs satisfactorily on c.w. too. However, what may appear to be a clean c.w. signal from the 32S-1, when signal strengths are weak, becomes recognizable as a strong main signal accompanied by a much weaker signal about 1350 cycles lower in frequency when signal strengths are high. This is frequently noticed with the addition of a kilowatt amplifier and 3-element beam set up.

This spurious signal is annoying to the critical c.w. operator's ear (FCC, too). The existence of this "birdie" instigated a search for its cause and an ultimate cure. While arriving at a correction for this particular problem a number of other improvements were developed which will also be described in detail.

The C.W. Problem

The source of the birdie was found to be in the method of generating the c.w. signal. In the 32S-1 the c.w. signal is generated by mixing the 1.350 kc audio signal (used also for tune-up) with the 456.350 kc b f.o. signal in the balanced modulator. The resulting difference frequency (456.350 – 1.350) is at 455.000 kc. This is the middle of the passband of the mechanical filter. The sum frequency (456.350 + 1.350) is at 457.700 kc, well beyond the passband of the mechanical filter. The trouble-maker is the b.f.o. frequency at 456.350 kc which is supposed to be reduced about 30 db by proper adjustment of the balanced modulator. About 20 db more reduction of the b.f.o. frequency is attained on the skirts of the mechanical filter. This makes a total possible reduction of about 50 db or more. Difference mixing is used in one of the conversions of the 455 kc signal to the output frequency so the nulled b.f.o. frequency gets flipped to the low frequency side of the main signal.

Careful scrutiny of the c.w. signal from 32S-1 transmitters with receivers of good selectivity reveals that the birdie is certainly there. Signals from some units appear much cleaner than others. Apparently the balanced modulators are in widely varying degrees of balance, dependent somewhat upon the recentness of the adjustment and the stability of the surrounding components. At any rate, what should be done to eliminate the spurious signal? Whatever the modification might be, the goal was to do the job without resorting to a full-scale rework, cutting, or drilling of the unit. It was considered desirable to retain the existing functions; the equipment is easy to tune up and operate as is. We wanted to retain the c.w. break-in and sidetone monitoring features. There should be no extra controls to operate—no switches or controls to forget to set. Retaining the transceive ability on c.w. would be desirable, too.

The original route of our thinking was to follow the practical method used in the Collins KWS-1. This method, as might be used in the 32S-1, would involve disabling the 1.350 kc tone and going around the balanced modulator with the b.f.o. to the first stage after the filter. We have heard reports of success with this method. Since this appeared to require disabling the tone oscillator, the break-in and sidetone features would be eliminated. Also transceive operation on c.w. would be precluded. There is the advantage with the KWS-1 method, however, of having the v.f.o. dial read the operating frequency rather than the "suppressed carrier" frequency.

The KWS-1 method would require switching of several leads in the 32S-1 at rather widely

*15225 Caravaca Road, La Mirada, California.
†418 El Adobe Place, Fullerton, California.

separated points. Small relays and transistor switches were considered. All these complications did not meet the desired requirements we would like to have in the ultimate modification.

The next route taken was to disable the audio signal for c.w. operation and run the signal from the b.f.o. through the unbalanced (improperly adjusted) balanced modulator. This met an early death when it was found that the frequency of the b.f.o. was such that it was about 20 db down on the skirt of the mechanical filter. The attenuation was too great to permit full-power operation.

It was realized at this point that the signal would have to be in the passband of the filter to produce a signal of the strength required with the existing circuitry. As the next step we obtained a 455.000 kc crystal and installed it in the 32S-1 b.f.o. c.w. position. It worked fine. With the audio oscillator disabled, however, there were no c.w. break-in and sidetone monitoring features. By temporarily grounding the grid of the cathode follower which feeds the balanced modulator, the audio was eliminated from the balanced modulator and was passed on to the break-in and sidetone circuitry.

Careful listening revealed a spurious signal again, although weaker than when we started. Probing around with a 2 mf capacitor connected to ground helped locate the cause of the birdie (as well as blowing two of the diodes in the balanced modulator). The sneak path of the audio signal was found to be through R_3 in the grid circuit of the second audio amplifier, V_{1_B}, to the second mixer, V_5. This path through R_3 is grounded in all modes of operation except c.w. For c.w. operation, V_{1_B} is block-grid keyed along with V_5 in order to develop the keyed audio signal used for the sidetone and to operate the vox circuitry for c.w. break-in.

Well, here was another problem to solve. The 2 mf capacitor used for probing around bypassed the audio signal to ground, but since it was connected in the rather high resistance keying circuit, the keying became much too soft. What we needed was a filter for the audio signal which would provide the proper d.c. series resistance to replace R_3 and still not affect the keying significantly. The twin-T circuit fills the bill here. Consulting a twin-T design nomograph resulted in some reasonable values for the filter. The filter did the job, and the signal appeared to be clean again. The twin-T filter has its output end grounded in s.s.b. operation, but the high reactance values of the filter do not affect the speech.

To remove the audio input to V_{2_A} (the cathode follower which drives the balanced modulator) its grid was connected to an unused contact on S_{8_B}. This contact grounds the grid and thus eliminates the audio signal from the balanced modulator during c.w. operation.

Now we needed a method for unbalancing the balanced modulator for c.w. operation, leaving it balanced in all other modes. Also a method was required for varying the amount of unbalance as a means of controlling the drive to the power amplifier. Of the several methods considered, most required an additional control to be added. The scheme which resulted made it possible to locate the control on the same shaft as the MIC GAIN, the normal drive control.

The unbalancing method finally designed applies a d.c. bias to the arm of balancing potentiometer R_{14}. This d.c. bias causes one of the diodes in the modulator to lower its resistance and unbalance the modulator in accordance with the amount of voltage. This is similar to the manner in which the diode balanced modulator normally operates for s.s.b. except that for s.s.b. the bias is not d.c. but a.c. (audio).

Now it seemed we had all the elements of the correction of the 32S-1 with the exception of a method to switch the c.w. excitation control in the circuit for c.w. and out of the circuit for the other modes. What was required was a ground in all modes except c.w. This ground had to be a good direct one with no bias on it. Several different methods were considered and discarded. There just did not seem to be any switch contacts left-over which would fill the bill. All that was left to do was to change some of the existing switching circuitry.

By removing some of the existing wires from S_{8_B}, a switch section becomes available which can provide the required switching function. The function of S_{8_B} was to ground the push-to-talk line so that the vox relay would be operated in the TUNE and LOCK KEY modes. But this action is required only in case the MIC GAIN is set to the minimum end of the range so that the switch (S_{14}) is actuated, grounding the audio signal to the vox circuitry. The switch on the MIC GAIN control is used only in two alignment procedures which require the vox to be tripped anyway by setting the vox gain to the push-to-talk (PTT) position.

Omitting the switch from the MIC GAIN control makes installation of the new control much easier since there no adequate room for the switch in addition to a double potentiometer.

We assumed that this was the end of the required modifications only to listen to the 32S-1 output signal more closely and find some new spurious signals. These new signals were weaker in strength than those caused by the audio signal and were separated by about 1.350 kc. The spurious signals were heard at 2.700 kc, 4.050 kc, 5.400 kc, and so on, lower in frequency than the main signal. The source of these signals was determined to be harmonics of the tone oscillator. We had taken care of the fundamental of the audio signal with the twin-T, but the harmonics were still getting through R_3 to the second mixer. Opening the cathode of the audio oscillator confirmed the source of the trouble, and, for a while, we were about to do away with the audio oscillator to correct this. But that would mean loss of c.w. break-in and sidetone.

We tried *RC* filters in the oscillator output, changing the audio oscillator bias and bypassing, all with little success. The *RC* filters cut down the fundamental as well as the harmonics.

Finally, it was found that an *LC* circuit was the only means to achieve a rapid enough attenuation to cut-off from the second harmonic on up, without affecting the 1.350 kc fundamental. The first *LC* filter employed an expensive wide-range variable inductor integrated into the twin-T circuit. The method finally reached located the inductance in the output circuit of the audio oscillator. Only a toroid inductor and a capacitor are required in this circuit.

Modifications

If the c.w. break-in and sidetone features are not desired, only the first two steps described below are necessary plus the addition of opening the cathode of the tone oscillator in the c.w. position (S_{8C}, fig. 1).

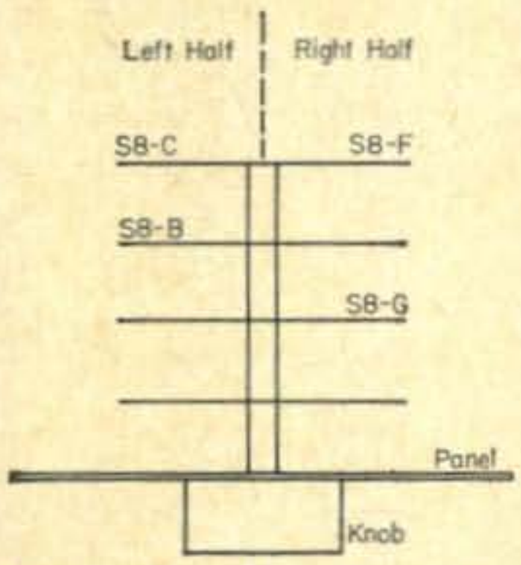


Fig. 1—Bottom view of the Emission switch, S_8.

Here are the steps required to accomplish the modifications described.

1. **C.w. Crystal**—Adding the 455 kc crystal for c.w. in place of the USB crystal is easily accomplished. Switch S_{8F} may be identified by the two b.f.o. crystals connected to this switch section. (See photo, fig. 6.) The jumper between the USB and CW contacts of S_{8F} must be clipped out (fig. 2). Then the crystal is connected between the C.W. contact and pin 3 of V_2. Unless a crystal with wire leads is used, it will probably be found desirable to use connectors removed from an old tube socket to connect to the crystal. For small size crystal holder pins use connectors removed from a miniature tube socket; for octal size crystal holder pins use connectors from an octal socket.

2. **Injection Control**—The old MIC GAIN potentiometer should be removed in order to replace it with a new unit which will accept a ganged potentiometer on the same shaft for the C.W. injection control. The forward unit is a Centralab B-60, ½ meg ohm potentiometer and was used to replace the old MIC GAIN pot. The ganged rear unit is a Centralab SR-6, 2000 ohm unit. The shaft on the new potentiometer must be sawed off and filed to fit the knob; use the old pot as a guide. The old MIC GAIN control connections should be reconnected on the ½ meg ohm pot.

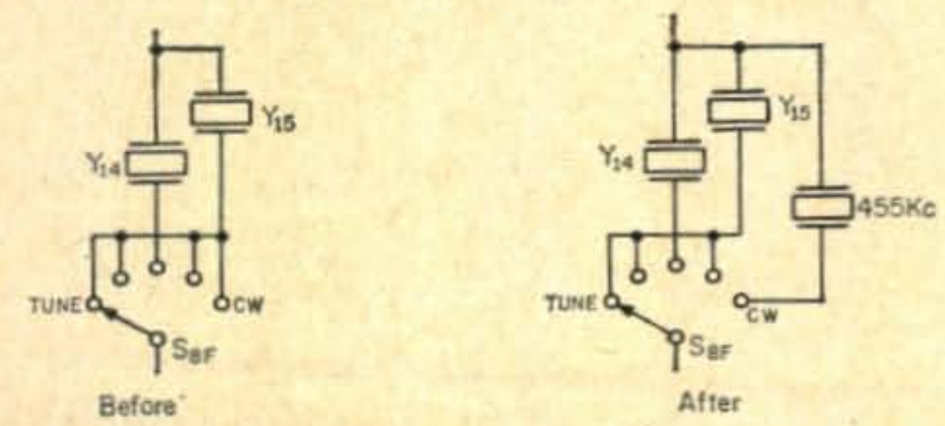


Fig. 2—Circuit modifications necessary for the insertion of a 455 kc crystal for improved c.w. operation.

The injection control potentiometer and the bias voltage source are connected through shielded wire to S_{8B} (fig. 3). The function of S_{8B} is to ground the injection control bias source in all modes except CW. As previously mentioned, it is necessary to modify the connections to S_{8B}.

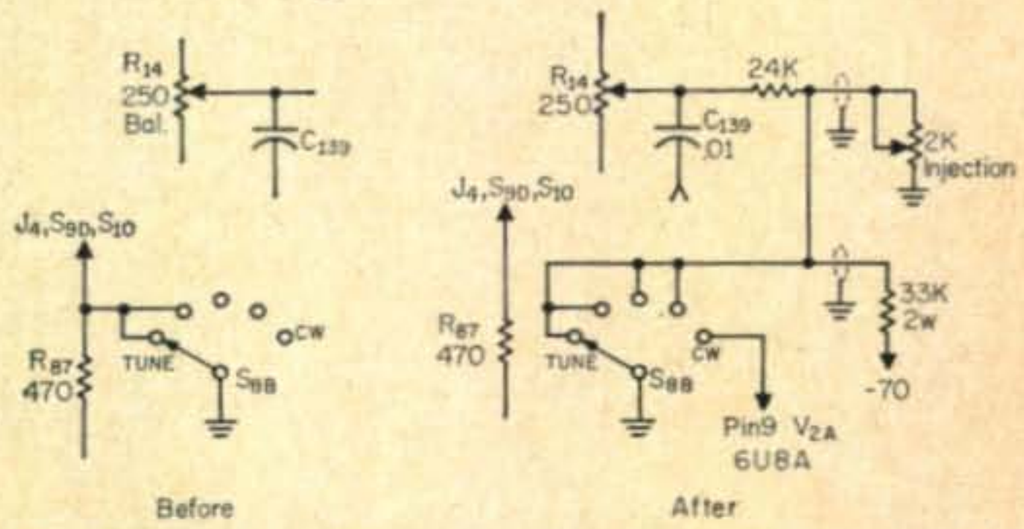


Fig.3—Circuit modifications for the Injection control, ganged to the Mic. Gain pot. The Mic Gain circuit is unchanged and is not shown.

To remove the existing connections from S_{8B}, the knob and the shaft nut and lock-washer should be removed from the EMISSION switch. This allows the switch to be pushed back and twisted up to expose the connections. The end of R_{87}, the 470 ohm resistor between pin 8 of V_{11} and S_{8B} may be now removed from the switch along with the wire also connected to the same terminal of the switch. The wire is white-orange-red-blue, and is laced back with several other wires. By sliding a length of insulating sleeving over the wire before soldering the resistor lead and the wire together, the insulating sleeving may be slid over the bare resistor lead and the soldered connection. It should be noted that the routing of the wire connecting S_{8B}, S_{9D}, and S_{10} is not reflected in the Collins schematic diagram.

The LOCK KEY and TUNE terminals of S_{8B} are already jumpered together. These terminals should be also jumpered to the LSB and USB terminals.

The rear CW potentiometer connections should be run through shielded wire over to S_{8B}. From S_{8B} the source of negative voltage is obtained from the –70 volt supply through a 33K series dropping resistor. This resistor value may have to be increased or decreased in order to make the MIC GAIN (injection control) setting appear near the one used for s.s.b. operation.

The –70 v. supply is available on the next-to-the-rear tie point of the terminal strip which is located closest to the power socket and near the edge of the chassis (fig. 4). A single tie

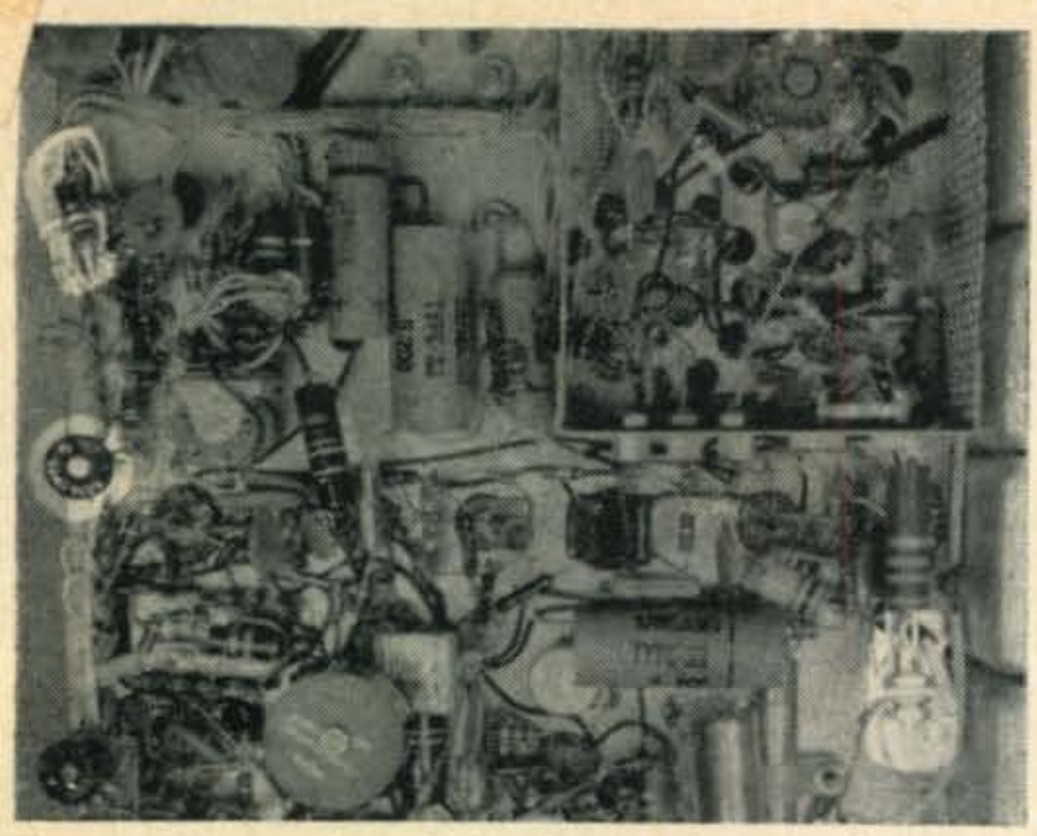


Fig. 4—Bottom view of the chassis showing the minus 70 volt terminal in the upper left corner, the keying time constant pot below it and the zener diode on the right used to regulate the v.f.o.

point terminal strip may be mounted under the rear screw holding the existing terminal strip. This new terminal strip and the existing –70 volt tie point provide points for mounting the 33K dropping resistor.

A wire should be connected between the c.w. terminal of S_{8_B} and pin 9 of V_{2_A}, the grid of the cathode follower. This connection causes the grid of V_{2_A} to be grounded in the c.w. mode, preventing the signal from the tone oscillator to be coupled into the balanced modulator.

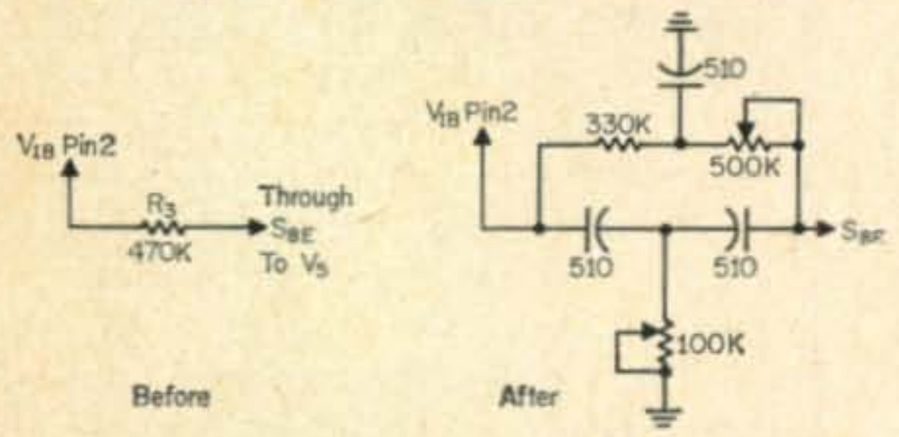


Fig. 5—Circuit of the twin-T filter used to block the passage of the audio signal from V_{11}, the tone oscillator, to V_5, the second mixer.

3. **Twin-T Installation**—Resistor R_3 is removed and replaced by the twin-T filter shown in fig. 5. By using miniature components, the whole filter may be mounted on its own leads. Larger components may require a small piece of phenolic board for mounting as shown in fig. 6.

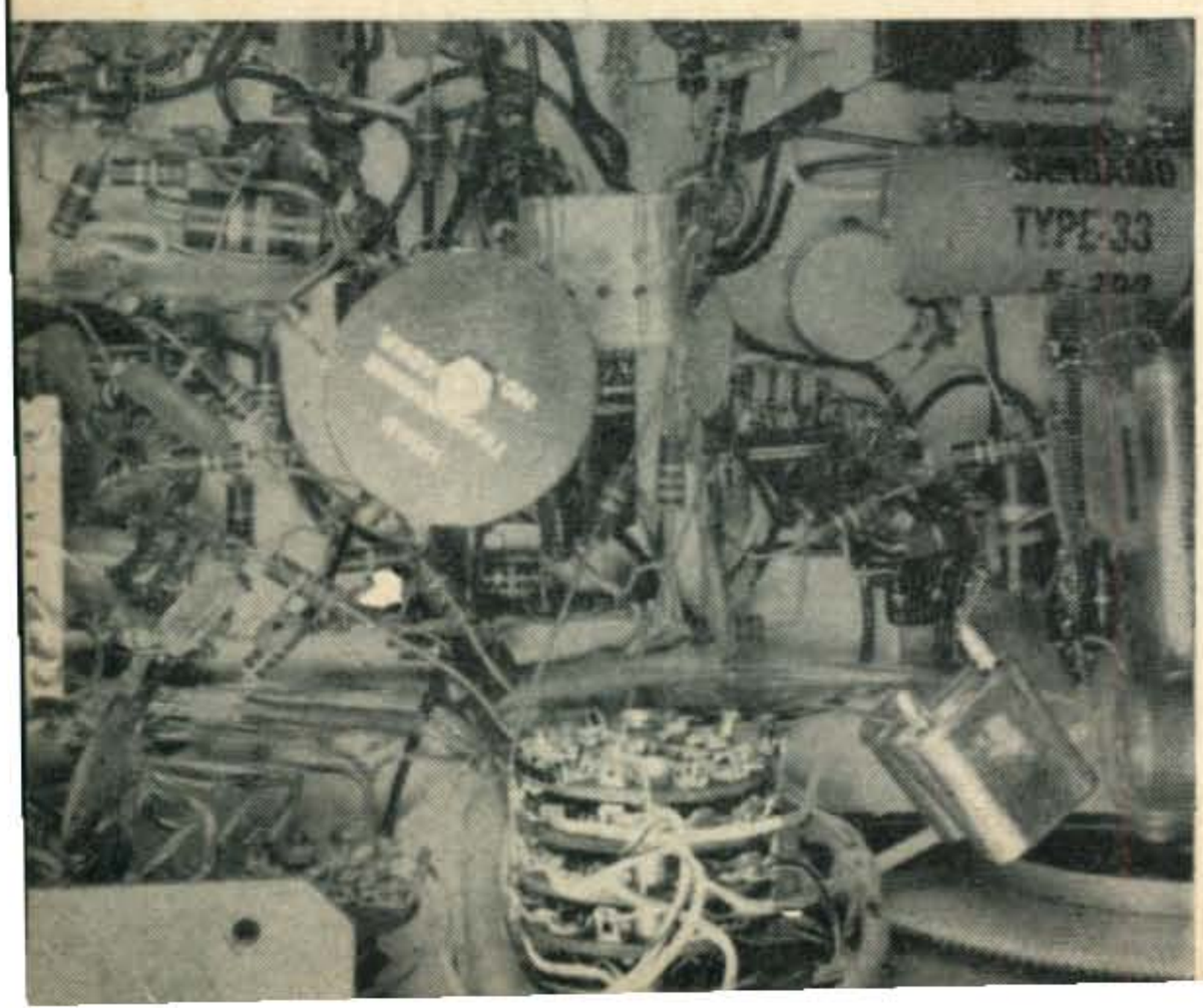


Fig. 6—Photograph showing the location of the twin-T filter on the left and the 7hy inductor for attenuation of the tone oscillator harmonics in the upper center. The mode switch, S_8, is located bottom center with the 455 kc c.w. crystal to the right of it.

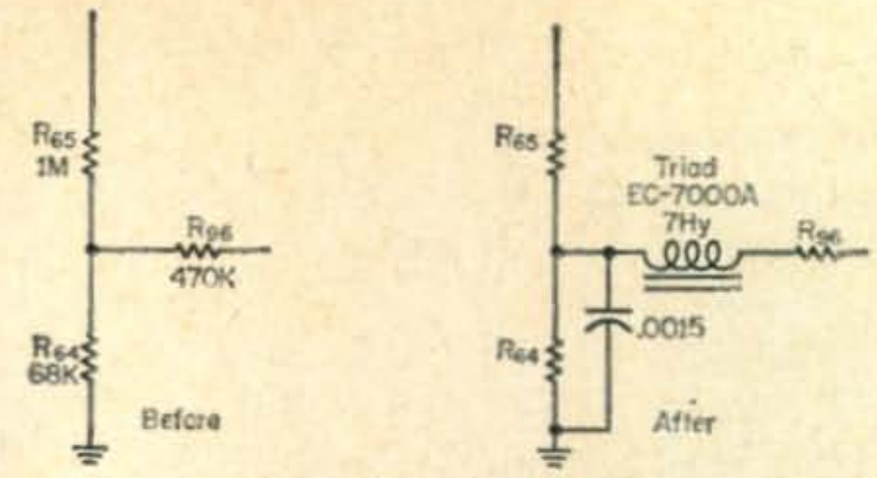


Fig. 7—Circuit of the low-pass filter to reduce harmonic content of the tone oscillator.

The twin-T filter is adjusted for the minimum spurious signal 1.350 kc below the main signal. Use maximum selectivity in the receiver while making the adjustment. Also, the two potentiometers interact slightly so several adjustments of first one potentiometer and then the other are required.

4. **Low-pass Filter Installation**—The tone oscillator harmonics are attenuated by the low-pass filter in the oscillator output circuit. The filter consists of a 7 H Triad EC7000A toroid inductor and a 0.0015 mf capacitor connected between R_{96} and the junction of R_{64} and R_{65} (fig. 7). With other 7 H inductors of higher Q, it was found necessary to tune the inductor with a parallel connected capacitor. (A parallel connected dual section broadcast capacitor was found to be of an aid in finding the value of resonating capacitor required. Using small values of capacitors seemed to jump over the null spot.) It seemed best to use the Triad EC7000A with its resonant frequency very close to the second harmonic of the tone oscillator.

Other Improvements

As previously stated, while arriving at these corrections, some others where developed which could conceivably improve the operating convenience of the 32S-1. These are outlined below.

Variable Keying Time Constant—The keying may be sharpened by altering the time constants in the keying circuit. This is especially necessary after installing the twin-T with its resulting softening of the c.w. keying. This change allows adjustments of the keying from too soft to bad clicks.

Parallel R_{70} with a 1 megohm potentiometer; parallel R_{71} with a 0.02 mf capacitor as shown in fig. 8. The 0.02 mf capacitor may be most easily installed directly across the key contacts. This capacitor was found necessary to cure a tail on the break.

VFO Harmonics—At this state of the spurious signal hunting, we thought all of the unwanted signals had been eliminated. The c.w. signal

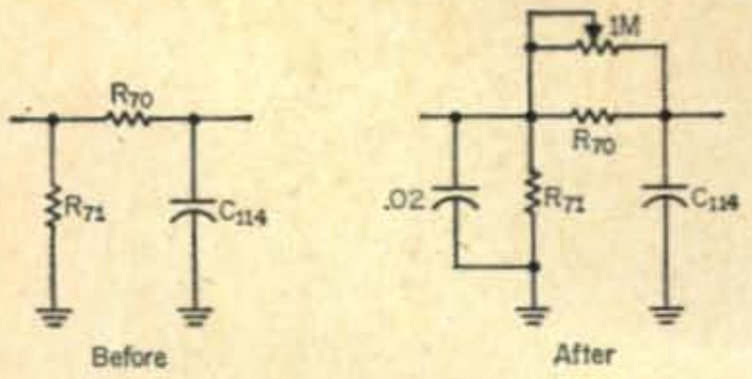


Fig. 8—Circuit modifications necessary to permit adjustment of the keying time constant.

was apparently clean near the desired frequency but a weak spurious signal was found down the band. With the v.f.o. set at 14.074 mc the weak spurious signal was heard at about 14.040 mc. Tuning the v.f.o. to 14.078 mc caused the spurious signal to move to about 14.020 mc. Further tuning showed that this signal moved 5 times the frequency of the v.f.o. in the opposite direction. The fifth harmonic of the v.f.o. was being coupled into the first mixer. The spurious output was the fifth harmonic of the v.f.o. mixing additively with the second harmonic of the 455 kc intermediate frequency. A similar situation was found with the v.f.o. set to 21.070 mc; a spurious output was found at 21.045. It is easy to hear these spurious signals in a receiver adjacent to the transmitter; caution should warrant checking to ensure that they are not generated in the receiver itself. In this case, however, the spurious signals could be heard several miles away when driving a kw amplifier with the 32S-1.

It was found that using the 75S-1 receiver v.f.o. for transceive operation, the spurious signals could not be heard. The difference being that the receiver has a low-pass filter in its v.f.o. output circuit which attenuates the v.f.o. harmonics. Placing a filter identical to the one in the 75S-1 in the 32S-1 v.f o. output did the trick; no more spurious signals.

The required pi-filter consists of two 500 mmf capacitors and a 10 microhenry r.f. choke in the coax lead from the 32S-1 v.f.o. to the first mixer as shown in fig. 9. The most convenient place to mount the filter is at the FREQ CONTROL switch (S_{9B}). The components are small and may be mounted by their leads on the switch contacts.

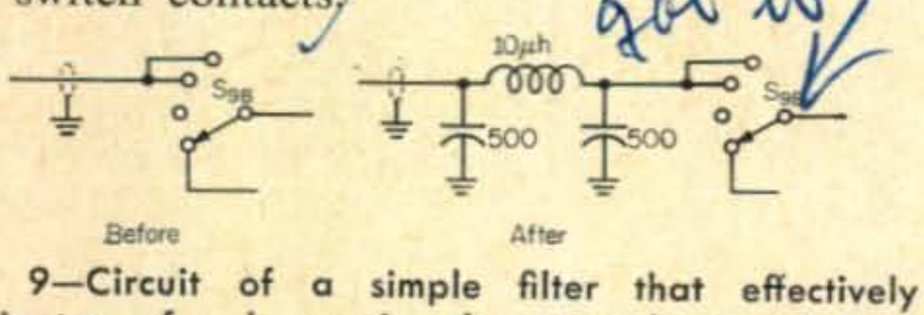


Fig. 9—Circuit of a simple filter that effectively eliminates v.f.o. harmonics that may be coupled to the first mixer. Switch S_9 is the Freq. Control.

V.F.O.—For those who wish the ultimate in frequency stability, several improvements may be made in the v.f.o. First, the filament voltage may be regulated either by the use of zener diodes[1] or a saturable reactor type 6.3v. filament transformer. The use of either of these methods may require two sources of filament voltage and these may be accommodated by rerouting the filament wiring and separating the two filament strings. This will be a problem for those using the Collins 516F-2 power supply because of the cabling and single filament source.

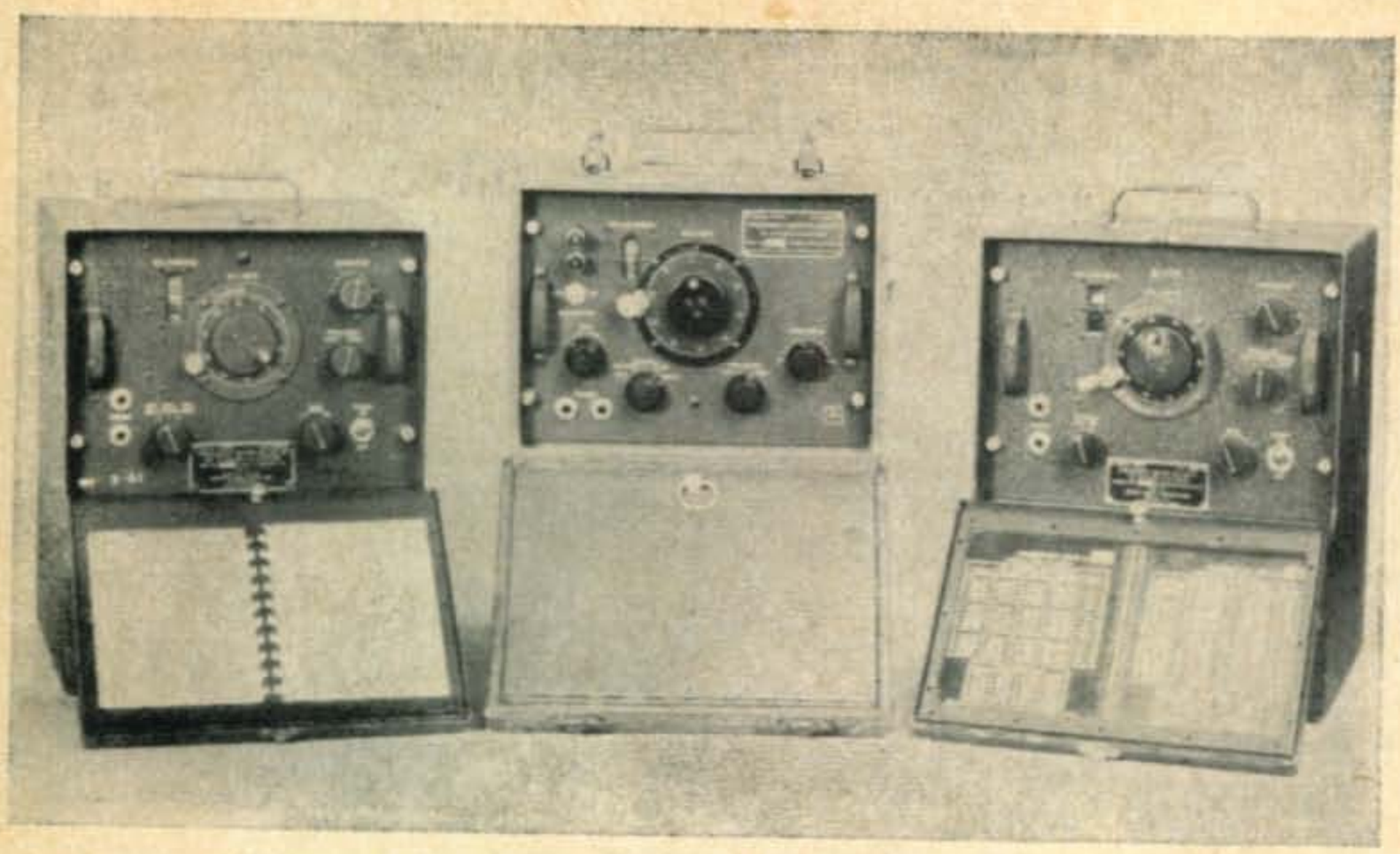
Secondly, the oscillator plate and screen grid supply voltage should be regulated. The v.f.o. supply voltage varies only approximately 6 volts in the CW mode; this causes a small but pronounced frequency shift. This is especially evident when the 32S-1 is used as an exciter to drive a higher powered amplifier causing line voltage variations. A v.r. tube cures this problem nicely at precisely the same voltage. This may be done readily with an 0A2 connected between ground and R_{17}, the 33K B+ dropping resistor. A 15K 2 watt resistor in parallel with R_{17} gives the proper total value for the dropping resistor. The regulator tube may be conveniently mounted on a bushing on the deck above without any drilling or cutting. A small self-tapping screw protrudes near V_3 and is used for securing the bushing for mounting the socket. The lead to R_{17} goes through the existing hole for the v.f.o. cable. Further improvement in stability may be accomplished by installing 0.02 mf disc ceramic bypass capacitors from the B+ and filament leads to ground at the terminal strip which mounts R_{17}, etc. These leads were found to be hot with r.f. under key-down conditions even though they eventually are by-passed by C_{306_B} and C_{167}. A simple test for this is to bypass these leads to ground with a large capacitor and note the frequency shift.

There are a number of relatively sophisticated, and expensive, high voltage zener diodes which will improve the oscillator +150 volt source in place of the v.r. tube. One of these which has been employed with excellent results is the Hoffman 1N3010B which provides approximately +130 volts regulated. With the 1N3010B, a 10K, 4 watt resistor is necessary in place of R_{17}. Zener diodes usually require a small capacitor across them to reduce the noise they generate but the existing capacity was found to be sufficient.

Balanced Modulator—The existing four-diode modulator will do the job, but a superior, more stable modulator may be made up using 1N252 silicon diodes and Corning type N20 one-half watt, or other equally stable resistors. Of course, the diodes must be matched, preferably on a curve tracer, and the usual precautions exercised in mounting them on long leads and balancing their physical layout. An Allen Bradley RV-6 100-ohm linear taper balancing potentiometer may be substituted because of its superior temperature and mechanical characteristics for the potentiometer R_{14}. The standard bridge balancing will have to be accomplished following the change of these components. Be

[*Continued on page 106*]

[1]*Zener Diode Handbook*, International Rectifier, El Segundo, California.
Toback, P. L., "Vacuum Tube Heater Regulation Using Zener Diodes," *Electrical Design News*, Sept. 1958.



Shown here are three different versions of the BC-221. From l to r, BC-221M made by Bendix, the BC-221AN made by Cardwell, the very latest model and the BC-221F made by Zenith.

Notes on the BC-221

BY HERBERT W. GORDON*, W1KWB/W1IBY

The BC-221 (or LM version), a desirable instrument in the shack, can be made more versatile and dependable with the suggested techniques and modifications. A comprehensive summary of all past articles covering this frequency meter is also given.

IN THE practical sense, it isn't my wish to explain the operation of the BC-221 or LM frequency meter since this subject is covered adequately in the calibration book accompanying each instrument and is fully covered in the technical manual TM11-300 issued by the government printing office. Rather, it is my wish to convey information not ordinarily found or otherwise available which will help the user obtain the maximum benefit from the LM series or BC-221 type of instrument.

Before detailing what these specifics are, I would like to stress the need for thorough and complete understanding of the basic operating functions of the instrument. As a matter of fact, the operator should be so conversant and so familiar with these functions that he should be able, almost subconsciously, to understand the limitations and order of processes required in using the instrument.

Assuming such a degree of experience and utilizing the best possible techniques, it is possible to achieve an order of accuracy with the BC-221 amounting to .002% or even better. In contrast, the inexperienced, taking a BC-221 as he gets it and merely getting it to function, will probably realize errors as great as .015%.

Determining Instrument Condition

Before going any deeper into the subject, it is recommended that each BC-221 be examined or analyzed to determine its degree of condition, and I don't mean mechanical condition as much as I do electro-mechanical condition. Actually, this is one instrument where every screw and bolt has to be tight, where every soldered wire has to be right, and where any significant changes in some portions of the circuit simply cannot be tolerated.

To determine whether your BC-221 is in good condition, two simple tests are available. However, the first thing to do in checking your BC-221 is to remove the nameplate, carefully putting aside the screws and lock washers. Behind the nameplate there should be chalked or crayoned a number. This was put on by the original manufacturer and this number subsequently became the serial number on the nameplate and on the frontispiece of the calibration book. If your BC-221 calibration book number does not match the plate or the number behind the plate, you are in serious difficulty. Many plate changes were employed by disreputable dealers in an effort to sell BC-221's. I have noted in examining some thousands of instruments that, at various times, the manufacturer omitted marking his serial number behind the nameplate, so this omission by itself shouldn't be considered too serious. If the book does not match your instrument it is still possible to use the frequency meter and calibrate it with its own harmonic markers and sub-har-

*Woodchuck Hill Road, Harvard, Massachusetts

monic markers and with the aid of a slide rule, provided that the instrument is otherwise in excellent condition and complete. Such a process of calibration involves a great deal of work and careful concentration to avoid errors and was thoroughly covered in a previous magazine article.[1]

Checking For Accuracy

To check the frequency meter for accuracy the following procedure may be used. Set the function switch to the HETERODYNE OSCILLATOR or OPERATE position. Set the RANGE switch to HIGH. Set the MAIN TUNING dial somewhere in the 2000-2500 kc region. A suitable spot would be 2333.333 or 2250 kc. Now switch back to the CRYSTAL CHECK position and observe the resulting beat note heard in the earphones. The note should not exceed 150 cycles.

Another and somewhat more suitable test is to set the frequency meter to any crystal check point in the HIGH range. Zero in with the corrector in the prescribed manner. Set the function switch to the HETERODYNE or OPERATE position. Do not disturb the corrector setting. Now, move the MAIN TUNING dial to the next check point listed in the calibration book. Set the function switch back to the CRYSTAL CHECK position; a tone will be heard in the phones. Note the MAIN TUNING dial reading and tune the dial for an exact zero beat. If the difference in the two dial readings exceeds 1.2 divisions, the calibration is not good.

On the low band this same test should indicate a maximum error not greater than 1.8 dial divisions. If the error is greater than this, your instrument is bad. The smaller the error the better the condition of your instrument.

At this point I would like to inject a third test utilized by the government to determine the quality of a BC-221. This test involves a second instrument, preferably a lab instrument of better quality, but it can be a second BC-221, the quality of which is beyond question. The easiest method involves the use of frequency meter type receivers such as the 51J, the R338, R389 or R390 series. To check a BC-221 with these auxiliary devices, there are five specific test points on the low bands. These are: 130 kc, 160 kc, 190 kc, 210 kc, and 240 kc. On the high band there are four reference points tested. These are: 2100 kc, 2400 kc, 2900 kc, and 3800 kc. The deviations in dial divisions, when checked at any of these specification points against an external standard, should not exceed ½ dial division as measured with the vernier scale in order to be considered an excellent instrument. In effect, an instrument to be certified for FCC purposes must meet this particular test. Those whose deviations reach one dial division are considered good and those greater than 1½ dial divisions are considered poor.

[1]Dudley, B., "Calibrating a BC-221 Frequency Meter," *QST*, March 1950, page 40.

Maximum Frequency Error

Since the principal application of the BC-221 is to measure radio frequencies so as to determine edge of band positions in compliance with tolerances imposed by the FCC, it follows that the ordinary error found in the BC-221 should be both understood and rectified.

The technical manual TM11-300 is the source of the following statistics on possible frequency errors.

Cause	*Error in Cycles*
Small shocks (caused by handling and thrust on the dial and panel)	100
Action of locking the dial	30
Warming up	100
Change of load on antenna post	50
A drop of 10% in voltage or of 5° C. in temperature	325
Error in calibration	500
Error in crystal frequency	250
Total Error	1,355 c.p.s.

This represents 0.034% error at 4000 kc and is the theoretical maximum. Many of the errors may actually cancel each other rather than be additive. Also, the error is less at lower frequencies. For example at 2000 kc it is only 985 cycles and 125 kc only 180 cycles. The average error that can be expected would be closer to 0.015% than 0.034%.

With these error percentages in mind consider the problems of checking band edges or setting a v.f.o. on the Army MARS frequency of 3289 kc. A maximum error of 329 cycles is allowed by MARS. If the error is the maximum, 0.034%, the deviation can be as great as 1120.3 cycles. However, as pointed out before, the error is more likely to be in the order of 0.015% presenting the possibility of a deviation 494.25 cycles, still in excess of the maximum permissible error.

Improving Accuracy

How then may we employ the BC-221 as a reliable tool for measuring our frequency? The answer lies in a system known as the additive or subtractive system which recognizes that the very accurate 1000 kc crystal oscillator bears the main responsibility for measurement accuracy and that the low frequency range of 125-250 kc is more uniformly frequency stable than the high frequency range of 2000-4000 kc.[2]

By the simple expedient of a small, easily effected alteration in the plate circuit of the multi-grid mixer, it is possible to utilize this additive or subtractive method to produce errors not greater than .0025% and very frequently much less than this.

[2]Grammer, G., "The Additive Frequency Meter," *QST*, May 1949, page 32. Riley, C. L., "Interpolation Frequency Measurements With the BC-221," *QST*, January 1956, page 41.

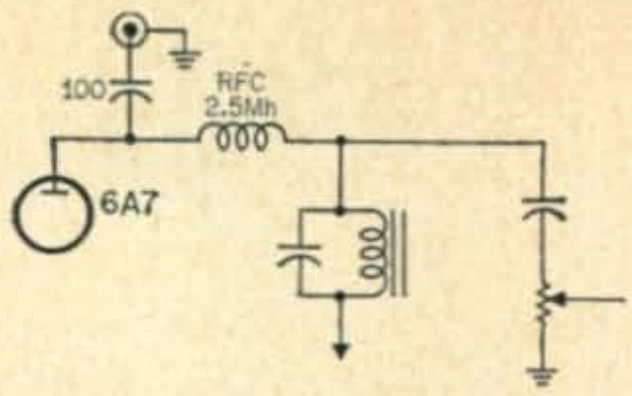


Fig. 1—Modification made in the plate of the mixer tube that will enable the additive-substract system of frequency measurement to be used. This can provide a great increase in frequency meter accuracy. The mixer tube type will vary from model to model and may be a 6A7, 6K8 or a 7B8.

The first mechanical alteration made in your BC-221 involves cutting into the plate circuit of the multi-grid mixer and inserting a conventional 2.5 mh r.f. choke as shown in fig. 1. The plate itself should couple through a small 100 mmf capacitor to a new output connector. If you wish to alter the panel you may insert a suitable r.f. connector jack such as a BNC fitting. Insertion of the r.f. choke and capacitor modifies the original circuitry so that the multi-grid mixer can produce sums and differences of both the crystal fundamental or its harmonics as well as the v.f.o. fundamental and its harmonics. Thus you can use the low frequency side of the BC-221 where the calibration book shows each 1/10 of a kc, and by doing so, with proper recognition of the beat notes, the accuracy can be improved by a factor of 10 or more.

The function switch still determines the mode of operation. It is normal in the HETERODYNE OSCILLATE position and you may now heterodyne in the CRYSTAL CHECK position as well.

To illustrate the additive or subtractive method, suppose that you wanted to measure 2360 kc. The second harmonic of the crystal (2000 kc) is beat with the second harmonic of 180 kc to give the frequency 2360 kc, *i.e.*, (2 × 1000) plus (2 × 180) equals 2360 kc. This also gives rise to other signal combinations but they will be 180 kc removed from 2360.

The accuracy of measurement is even better if you subtract, as an illustration, the 360 from the next one mc and set your low frequency range to the difference, or 640 kc. By this so-called subtractive system the error is halved.

There are slight complications in this method which are helpful rather than troublesome if they are used to advantage. The full procedure is to turn the BC-221 on and let it warm up for one hour with the band switch on LOW. To measure 2360 kc, set the dial to check point 181.82 kc and zero beat the CORRECTOR knob. This can be done, at least once, as soon as the frequency meter is turned on in order to determine the frequency drift during the warm-up period. This rate of warm-up is handy information in case it is desired, subsequently, to make a measurement with a cold frequency meter. (The direction of magnitude and drift should be noted.) Each vernier division will be approximately 2.7 cycles on the fundamental or 5.4 cycles for 2360 kc measurements.

Now set the dials to the settings given for 180 kc, the sub-harmonic of 360 kc. While listening on the frequency meter head phones, slowly rotate the main dial one complete revolution to the right and then to the left. You will hear lots of "birdies". Each of those little "birdies" is actually a check point accurate to .0001%. If you use a 12" piece of wire for a small antenna and set your frequency meter to 180 kc dial setting, then you could turn on the oscillator in your transmitter which is being set for 2360 kc, and slowly move the BC-221 dial a one-half turn to the right or left. You will note that while the "birdies" are still present, the beat note between your transmitter and the frequency meter can be heard over one complete revolution. (1000 vernier units) In fact, it will be difficult to find exact zero beat since it covers 4 to 5 vernier divisions.

The system described above is at first confusing due to the many beat notes heard, however, with practice, measurement of various frequencies can be made with little difficulty if you will remember that the beat notes in which you are interested change very slowly in comparison with the spurious beats.

Locating the Zero Beat

Three methods for finding the exact zero beat can be employed. One is the use of an external "magic eye" tube to be discussed later, a second is to take the center of the dial readings for the lowest audio beats and the third way is to plug an output meter into the phone jack.

The zero beat point can be recognized more easily if the low frequency response of the audio amplifier is improved. The low frequency response of the audio portion of the BC-221 can be greatly improved by the use of a high quality 8000 to 250 ohm output transformer in those models that use output transformers and by connecting a 10 or 20 mf, 20 volt electrolytic capacitor from the cathode of the audio stage to ground. In some models it is necessary to disconnect the audio stage cathode from the heater connection (ground) and to insert a ½ watt cathode bias resistor of 350-500 ohms. The original bias connection presupposed the use of batteries which provided the bias and most amateurs use these meters with a.c. supplies.

Time Saving Graphs

Interpolation between the frequencies listed in the calibration book is awkward and time consuming. You will save a great deal of time and obtain better accuracy if you make up a special graph or in reality two graphs for each major frequency in which you are interested. In the illustrated case of 2360 kc, one graph should cover the high band position using one square per vernier division on one axis and

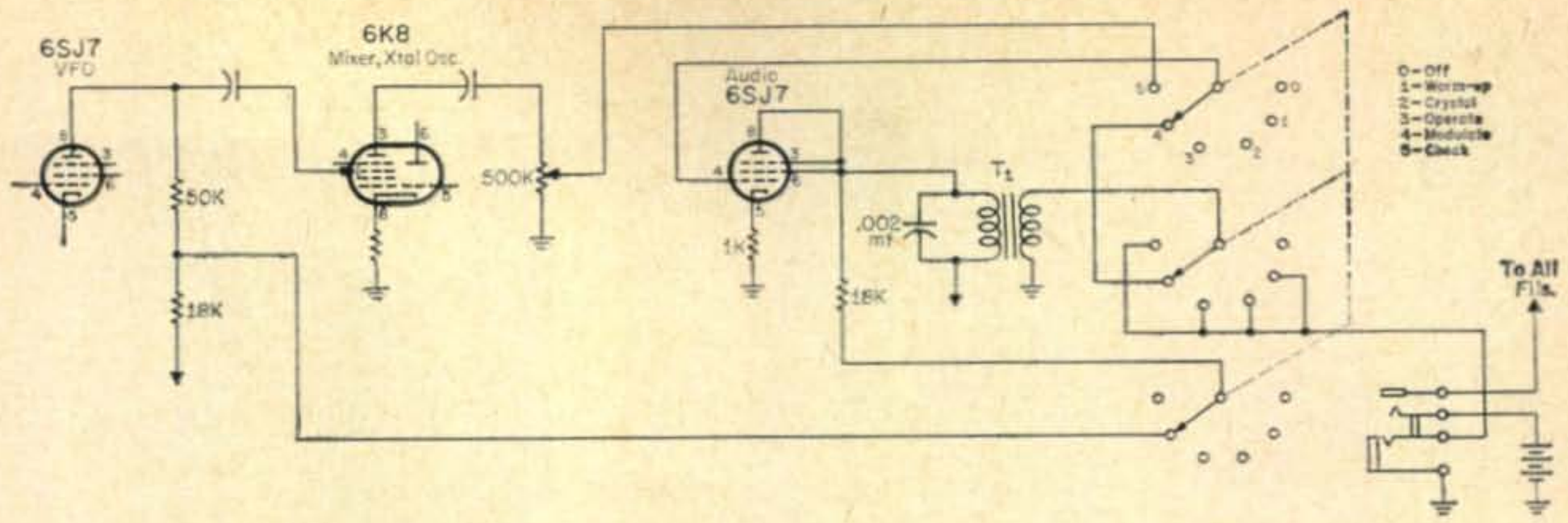


Fig. 2—Skeletal diagram showing the modulation set up in the BC-221 AK series. The output transformer, T_1, is used as the oscillator transformer in position 4. Audio taken from the plate of the 6SJ7 is fed to the junction of the two plate resistors in the 6SJ7 v.f.o. There are two more switch sections used to handle voltage distribution but these are not shown.

one square for 10 cycles of frequency (2357.5-2362.5 kc) on the other axis. Label this graph "rough measurement." For the additive method the second graph is employed and this should use 2/10 dial divisions per square on one axis and 10 cycles per square for frequency on the other axis. The graph line will cover the same 2357.5-2362.5 kc. Place red marks on the curve at plus .01 and minus .01%. The portions of the curve between .0075 and .01 may be drawn with red ink, the rest of the band with black ink. The red curve then suggests the accuracy limits.

Accuracy of the Modified BC-221

Summarizing the maximum possible accuracy of the BC-221, the best possible conditions would be to have a constant room temperature, a constant B voltage, a constant A voltage or filament supply, a quartz crystal which has been checked at plus or minus one cycle of WWV at 5 mc, a frequency meter that has been warmed up to reach thermal equilibrium and finally graphs which have been substantiated by spurious harmonic points.

Assuming these ideal conditions then the maximum errors that you could get would be: (1) the accuracy of the crystal 1/5 of a cycle per mc, (2) a calibration curve error not greater than 8 cycles in the low range, (3) a mechanical dial back-lash error of 4 cycles and, (4) a zero beat error of 5 cycles or less. Adding these together could come out to at least .0002% theoretical error.

Practical Improvements to the BC-221

Several modifications enhancing the value of the BC-221 have appeared in magazines[3] over the past decade.

Modulation—the most important improvement is perhaps the easiest one to accomplish and has to do with using the BC-221 as a signal generator. This change is accomplished by merely adding tone modulation to the local variable frequency oscillator and either of two ways can be employed to gain this end.

First, we can add a small audio oscillator transformer wired in as is shown fig. 2, the circuit of the BC-221 AK. This involves a change in the function switch which permits the output of the variable frequency oscillator to be modulated approximately 375 cycles. The function switch in the BC-221AK reads OFF - WARM-UP - CRYSTAL - OPERATE - MODULATE - CHECK. In the OFF position, both the A and B battery circuits or power supply are disconnected. In the WARM-UP position 6 volts is connected, through the switch built into the phone jack, to energize the filaments in the three tubes.[4] The B battery circuit is closed, subsequently, in the CRYSTAL position, energizing all tubes with the exception of the variable frequency oscillator. In the OPERATE position, the B voltage is applied to all tubes with the exception of the crystal oscillator portion of the multi-grid mixer.

In the MODULATE position, in addition to converting the audio amplifier circuit to an audio oscillator, the operation switch closes the B voltage circuit for all tubes with the exception of the crystal oscillator, and the plate circuit of the variable frequency oscillator is now connected to the modulator. In the CHECK position, the audio amplifier circuit is restored to normal and the B voltage is fed to all tubes. This modification involves the acquisition of a small audio transformer and two resistors in addition to changing the FUNCTION switch as shown in fig. 2.

A similar modulating device, but without the complexity of the AK circuit, is one which makes use of a simple NE-2 neon lamp and several other components. This cir-

---

[3]Pitts, J. E., "Tone Modulating the BC-221," *CQ*, August 1949, page 14. "Compact Power Supply for the BC-221," *CQ*, April 1947, page 30. Grayson, K. B., SURPLUS, *CQ*, April 1959, page 79. Wood, W., "Null Indicator for the BC-221," *QST*, May 1950, page 66. Carlson, H., "Adding Tone Modulation to the BC-221," *QST*, May 1948, page 68. Cross, H. "Using the BC-221 Frequency Meter at VHF," *QST*, January 1950, page 46.

[4]This is a safety precaution. The front panel lid cannot be closed if the phone plug is inserted. When the phone plug is removed the A batteries are automatically disconnected thus preventing accidental discharge.

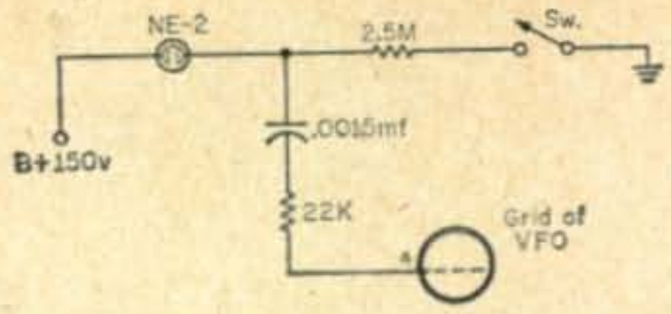


Fig. 3—A simple relaxation type oscillator developed by DL4VG (W9YUE). Care must be taken to keep the leads short.

cuit is shown in fig. 3. In operation, the switch is closed to provide a 400 cycle tone on the carrier of the local variable frequency oscillator.

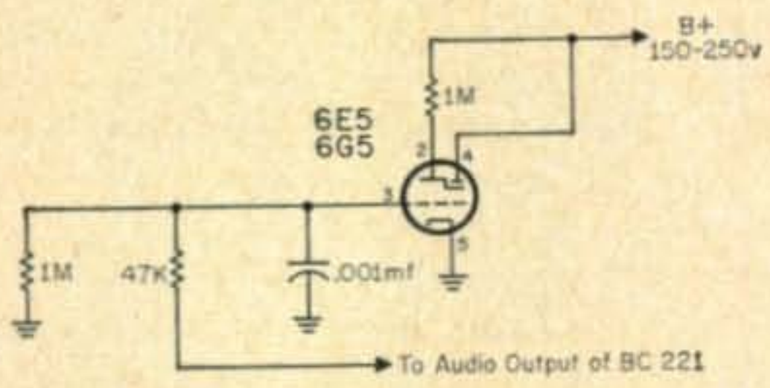


Fig. 4—An excellent null indicator makes use of a 6E5 or 6G5 "tuning eye" type tube. The circuit, suggested by VE4MW, permits the operator to observe low level signals that are inaudible.

Null Indicator—For those readers requiring a simple null indicator or zero beat detector, a 6E5 or 6G5 tuning eye tube, connected as shown in fig. 4 will provide a positive means for indicating the low frequency beat notes. This device may be constructed externally to the BC-221 and connection made through the phone jack if you don't wish to alter the BC-221.

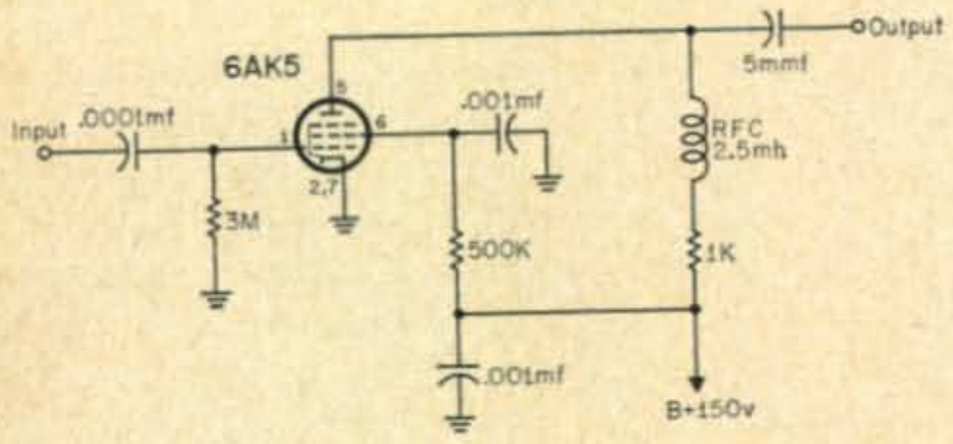


Fig. 5—A harmonic generator to improve performance in the v.h.f. range may be added to the BC-221.

Harmonic Generator—A most useful addition to the BC-221 is the harmonic generator using a 6AK5 miniature tube as shown in fig. 5. This can be assembled on a small bracket and fastened to the chassis of the original BC-221 and should not interfere with the function of the original controls in the slightest. Harmonics, useful through 300 mc will be generated by this device, and for those working with frequencies in the order of 2 and 1¼ meters this is a very desirable addition to the original BC-221.

BC-221 As an Audio Source

The BC-221 can be used as a source of reasonably good audio frequency sine waves by turning on the low frequency portion of the BC-221 and looking for the 10,000 cycle spread between 990 and 1000 kc. You will find that this takes up over 800 readable divisions with approximately 12 cycles per division. Therefore, with the meter in CHECK position, the resulting beat note will be a reasonably, accurately known audio frequency. To check this, tune in WWV on your receiver and feed the receiver output to the horizontal amplifier of an oscilloscope. With the frequency meter set to 996 kc, the 4 kc beat note which results should form a perfect circle or an ellipse when fed to the vertical deflection plates of the oscilloscope.

BC-221 As a V.F.O.

The BC-221, with the aid of suitable isolation amplifiers and then untuned voltage amplifiers, makes an excellent adjunct to either your sideband transmitter or it may serve directly as a v.f.o. A typical application would involve taking the output of the BC-221 with its precisely known control of frequency and feeding it into a cathode follower and thence into two or more stages of broadly tuned 6CL6 multipliers or voltage amplifiers from which point the output will in all probability be sufficient to directly feed a 2E26 or 5763 or 6146. Thus the BC-221 is capable of being a tremendous v.f.o. for a sideband exciter. More details on this type of application may be found by referring to the *Radio Handbook* published by Editors and Engineers at Sunnyvale, California.[5]

To reduce the confusion about the proper operation of the BC-221 and to make this valuable instrument even more popular to the people owning them, the author would be pleased to hear about other applications involving the BC-221 or its Navy counterpart.

Some further information may be gleaned from the previous articles listed below. ■

Bibliography

Chamberlain, N. K., "Identifying Frequency Meter Harmonics," *QST*, September 1952, page 24.

Dudley, B., "Adding a Bandspread Range to the BC-221," *QST*, August 1953, page 38.

Nebel, R., "De-Mothballing the BC-221," *CQ*, December 1950, page 28.

Dorsey, M., "Measuring Frequency with the BC-221," *CQ*, December 1950, page 29.

[5] *Radio Handbook*, Editors and Engineers, 11th ed., page 445.

DXpedition To Africa

Part I

BY GEORGE R. (DICK) McKERCHER*, WØMLY

WØMLY, well known to the DX fraternity for his operations under such exotic calls as FL8MY, HZ1MY and 6L6MY, to mention only a few, has departed on one of the most ambitious DXpeditions of all time. Under the auspices of the Yasme Foundation, Dick is now in Africa and will be operating from as many of the new African Republics as possible. The following is Dick's account of the first leg of his trip which saw him operating from Gabon and which, incidentally, is the 98th different country from which Dick has operated. During his stay in Gabon, where he operated as WØMLY/TR8, Dick made over 2700 contacts in a relatively short period of time. Our hats are off to Dick for his persistence in spending twelve to sixteen hours a day, in heat up to 110 degrees, to give many stations throughout the world a new country. Dick will try to have an article in CQ monthly, describing the trials and tribulations of his trip and we hope you will find it as interesting as we did.

I WAS in daily contact with Dick, KV4AA, and I knew that the *Yasme* Foundation was planning to send a DXpedition to the new African Republics. I had assumed that the person to go would be an African operator or a European. The operators who could do justice to such an ambitious undertaking did not seem to have the time for such a venture. One morning Dick and I were discussing the latest news of the operation and he asked me if I would like to make the trip. I had several months which I could devote to the expedition and I decided to give it a go. To get the ball rolling, that same morning, I wrote several letters to the countries in which operation was desired. The following day I applied for my passport renewal. One month, much letter writing, and twenty-three shots later, the human pin cushion was on his way to New York.

My first stop was at Chicago where the HT-37A, SX-115 and HA-1 keyer, which were to be used on the trip, were picked up. From Chicago, I went on to Export, Pa. where I met Angus, 5N2AMS and his wife, Doris, 5N2DMS, who were visiting Walter, W3RIS. Angus, who is quite a DXpeditioner himself, having operated as FD8AMS, TY2AA, and 5N2AMS/TR8, had a few pointers which he thought might be helpful during my stay in Africa.

From Export, I went to Washington, D.C. in order to obtain my visas. Mike, W3AYD, was a very big help while I was in Washington. From this point, on to New York where I spent a very enjoyable evening with my old friend, Willie Wilcox, ex-KT1WX and his wife at Riverhead, Long Island. The following day I met with a "friend" who was to have made arrangements for miscellaneous spare parts. However, he arranged for me to get these parts at full list price. Needless to say, my "friend" and I parted company at this point. I then decided to go to the *CQ* office where the editor, Arne Trossman, equipped me with log books and other useful information and directed me to Urb's (W2DEC) house where I spent the eve-

Here's a view of the operations building at the air port in Liberville. Missing equipment plagued Dick's operations but the Ole Iowan's ingenuity cleared things up in no time.

*Perry, Iowa.

ning. I got to Urb's to find out that a good-sized showing of the North Jersey DX Association had turned out and they sure did show me a swell time.

The following day a P&H linear was picked up at Lafayette Radio and then on to Idlewild Airport to drop my things off which were to be sent by air freight to Gabon. One small hitch developed; my intentions were to pay the air freight by check but that was not acceptable and I had to use part of my traveling cash. Unfortunately, this was on a Saturday and the banks were closed, so my Sunday reservation on the airline was postponed one additional day so that I could get to the bank on Monday. The North Jersey DX Association came to the rescue again and these fellows sure did everything possible to make my stay in the New York area a pleasant one. I spent that evening at W2JT's and we had another get together with more of the local ham population.

The Trip

I departed on Monday, as scheduled, for Paris where I arrived at 7:00 A.M. I was to have been met at the airport by F9OE but, unfortunately, our signals had crossed somewhere and I was stranded at the airport. On arriving in town, I learned that hotel rooms were virtually non-existent due to the fact that a world trade fair was being held in Paris at that time. After much trouble and a little bit of good luck, I finally found a room at $15 per day. Next, to clean-up and try and locate F9OE. There was no phone listing for him and then I thought I would be real smart and try to locate headquarters of the R.E.F., but they, too, were not listed in the phone book. The only thing left to do at this point was to board a train and go to Versailles and check Box 62, which is the R.E.F. post box. I finally found the address of the R.E.F. in Paris, so back on the train again, subway and taxi and I finally found F9OE. We had a very wonderful visit but I was to find out that much to my regret, no one in France was going to be of much assistance with any of the details for my African trip. When the former French colonies severed their relations with France, that thoroughly severed these relations too.

That night, a very enjoyable evening was spent with several of the R.E.F. members in Paris. Little did I know that my troubles were about to start. I was to leave the next night at 2130 and finally managed to depart at 0200. After many other formal delays, I finally arrived in Liberville, Gabon.

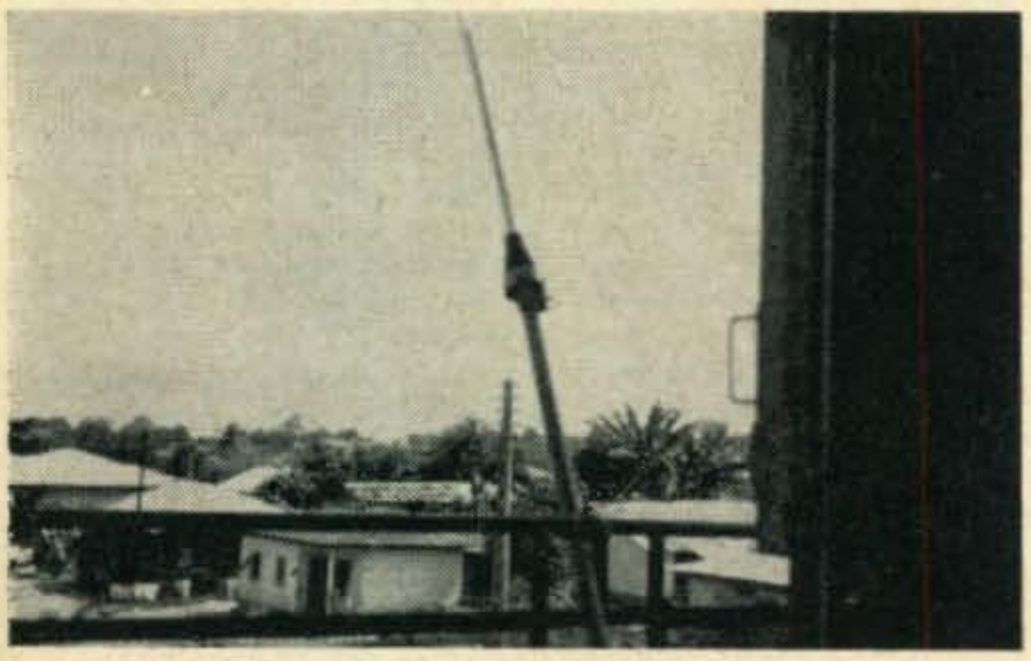
Troubles

I was all set to go. Written operating permission in hand, equipment sent on ahead, all I needed was a room and I was all set. Three hours later and with all possible places checked out, there was *no* room available. I went up to the American Ambassador's house for help. He finally made arrangements for a place for me to stay for three or four days. It was an empty room in an embassy employee's apartment. I slept (?) on two packing boxes.

With the room arrangements taken care of temporarily, I went about the business of getting on the air. I went to check with the official who had given me operating permission to let him know that I was ready to begin my operation. However, much to my regret, I learned that he had been removed from office because of improper conduct and his replacement was giving me the well-known brush off. Finally at 2130 local time (they work nights here because of the heat during the day) I emerged with permission to operate for a ten-day period. The only reason permission was granted was that I had come over on the strength of the letter which I had received. I do not know what the future holds for amateur radio here but it looks dim at this juncture.

Well, at last I did have a place to operate and operating permission was granted. Now, back to the airport for the equipment, but alas, it was too good to last and now I learned that the equipment had not arrived. A radio tracer was sent out on the equipment. I was in very low spirits as I returned to my packing-box bed. At this point, I was really crying in my beer and one must drink beer here as you don't drink the water. Four days later, the equipment arrived on a non-scheduled cargo plane, or should I say that most of the equipment arrived. A quick check disclosed that one box was missing and much to my horror, the missing box contained the SX-115. So, there I was sitting with a license that was going to expire in seven days with a transmitter, antenna, and operating position, but no receiver. From this point, I decided that on any future trip everything was going in one box. One large box is difficult to handle but it is also very difficult to lose in traveling.

I finally located an old, inoperative S-76 at the airport and managed to borrow it. After a



From the hotel in Liberville, WØMLY's Hy-Gain trap vertical was mounted on the balcony of the bedroom, overlooking the Gulf of Guinea. Dick knocked off 2700 s.s.b. and c.w. QSOs in nothing flat.

considerable amount of effort, I got the receiver into working condition and the first CQ from WØMLY/TR8 was sent out.

Operations

The first few days were spent on c.w. only as the box which contained the receiver also contained the microphone. Quite a few Europeans were worked before the band opened to the States. One of the first W-contacts was W2JT and I asked Earl if he could get my sad tale of woe to Chicago and see if arrangements could be made to send another SX-115 to Brazzaville. After two days on c.w., I had an idea and looked around for someone with a tape recorder. I finally found one and for a nominal consideration, I rented the microphone for the weekend and WØMLY/TR8 was on s.s.b., much to the delight of the phone men. Tuning s.s.b. on the S-76 was quite a chore to say the least.

The /TR8 operation is now past history. With over 2700 contacts, I think Gabon can safely be taken from the rare list. At the end of the operation, quite a few CQs were called with no response.

Some trouble was experienced at the start, from some fellows wanting to work me many times; not just *twice*, but eight or nine times, if I let them do it. I finally had to call them down for it and this soon stopped. On c.w., I had to stop tail ending. Not that tail ending in itself is bad, it's only that very shortly, front ending, middle ending and complete bedlam takes place. One of my pet peeves are the boys who would not respect a directional call. At times I would come back with something like; K8A?? and I stand by. Listening on the frequency, you wouldn't believe there were so many K8A?? on at one time. So back I went calling the same fellow again. When everyone did cooperate, contact speed doubled. When the band was open, I averaged sixty to sixty-four contacts per hour. The best was five in one minute on s.s.b. What most of the W-boys didn't realize was that by the time the band had open to W-land, I had already been on the air for six to eight hours working Europeans and far eastern stations.

There was one particular W3 who insisted on trying to break up my s.s.b. contacts with his c.w. I warned him three times but he did not heed the warnings so I deleted him from the log and I will certainly not work him at any future stops. After working for twelve to sixteen hours in 100° to 105° heat, with nothing but QRM, patience wears thin at times, at least mine did.

There were times when I just could not send what I was thinking. My fist just would not cooperate. An electronic key was also new to me and I had only a few hours practice before leaving the states but I will whip it before I am finished here (I hope).

All operation was accomplished with a 10-

Moving on from Liberville as WØMLY/TR8, Dick took time out in Brazzaville to visit with TN8AL and TN8AJ. That's one of the few powered boats on the Congo River.

15-20 meter Hy-Gain trap vertical without the radials. It worked so well I did not bother to install a beam for 20 meters. If more people worked 15, I could have had more contacts with the states. I ran out of stateside contacts on 15 and the band was open to the states when 20 meters was not. I got quite a chuckle out of one fellow who told me he had been calling me for two hours on a transceiver and on every call he had to tune from 14001 to 14340. This should be quite a test for the gear-train mechanism in his rig. Then there was one W2 who insisted I was not WØMLY, as he looked in the *Call Book* and WØMLY was listed as George R. McKercher, and I was giving my handle as "Dick." I wonder what he thought the "R" stood for, Rabbit perhaps?

The operation was closed down at 0700 GMT, June 6th. The gear was packed and shipper to Bangui, TL8-land, which is the next stop. I departed for Brazzaville to obtain the new receiver which was waiting at the South African airlines office. After a three and half hour uneventful trip, I arrived in Brazzaville and checked into a hotel. I went to the bank to pick up some money which had been wired ahead. The bank was closed so things were again back to normal. I was unable to locate the airline office and checked with the American Embassy. They told me that a Mr. Jones handled the South African airlines from his home, So, out I go and, you guessed it, no record of shipment of my receiver. I went to the airport and checked with the other airlines but no luck there either. Tracers were immediately sent out but nothing positive was established. I thought things like this only happened in stories, not in real life. Fortunately, I had the foresight to get the use of the S-76, if I promised to return it. At least I will be able to get on the air in TL8. I do not expect to get any results before I leave for TL8-land, so I am still sitting here crying in my beer. I guess I had better have another ham sandwich and get to bed.

So, Phase I of the trip is now history. Will keep you all informed of future operations! ■

Most published data for receiver selectivity consists of a curve indicating the performance when a single signal is passed across the i.f. bandpass. Unfortunately, in our crowded bands we rarely can hear a single signal. Rather, we are receiving two or more at a time. The author explains the effects of this condition upon the receiver performance and outlines a procedure whereby you can make these revealing tests yourself.

Two-Signal Selectivity Measurements

BY AL BROGDON*, W4UWA

MOST receiver manufacturers publish some indication of the selectivity of their receivers. This information may be in the form of a curve showing the bandpass characteristics of the receiver, or a statement of the bandwidth of the receiver at two typical values of off-frequency attenuation (*e.g.*, −6 db and −60 db).

What do these curves indicate? They show how the receiver will perform when receiving a *single* signal, with the frequency of this received signal being varied across the receiver's band pass.

While it is true that these published single-signal selectivity curves will give us a basis for comparison (assuming, of course, that the manufacturers are all using similar measuring techniques), it will not tell us how well the receiver will perform in the presence of interference. With the present-day congestion on the h.f. bands, amateurs need a method to determine the performance expected from a receiver when receiving a desired signal in the presence of another undesired signal. This method is called "two-signal selectivity," since it is a measure of the receiver's selectivity in the presence of *two* signals.

Background

Let us consider the difference between single-signal selectivity characteristics and two-signal characteristics of a receiver, and the reason why there is a difference. The single-signal selectivity of a receiver depends, for the most part, upon the selectivity of the lowest intermediate frequency stages in the receiver, and is actually a measure of the selectivity of all the tuned circuits in the receiver. This would be exactly the same as the receiver's two-signal selectivity except for one thing; the receiver tuned circuits are connected by vacuum tubes (or transistors), acting as non-linear devices, thus preventing the linear transfer of the selectivity of the lowest frequency i.f. stages back toward the antenna terminals. This non-linear action results in deterioration of the receiver's two-signal selectivity (as compared to the single-signal selectivity) because of three electrical phenomena which may occur: (1) Desensitization; (2) Cross-modulation; (3) Spurious responses.

Desensitization may be defined as a reduction in receiver gain caused by the reception of an undesired signal. This signal may be widely separated, in frequency, from the receiver band pass, so that no degradation other than reduction of receiver gain will be noted. Obviously, if a.v.c. is employed in the receiver, a strong signal may cause interference by generating excessive a.v.c. voltage thereby reducing receiver gain. In addition, receiver desensitization may occur due to strong signals causing increased flow of grid current. This increase in grid current will develop higher grid voltages which tends to reduce the receiver gain. This increased grid current may occur in the r.f. stage, converter stage, or i.f. stages. The stage in which the desensitization actually occurs depends on two factors; the frequency separation between the desired and undesired signals, and the ratio of the desired to undesired signal. For signals whose frequency is near the desired frequency, desensitization usually takes place in the i.f. stage. If the undesired signal is widely separated from the desired signal, the selectivity of the i.f. stage will prevent desensitization at this point, but the reduced selectivity (greater bandwidth) of the converter stages may allow desensitization at this point. For desensitization to occur in the converter stage, the interfering signal must be of greater amplitude than one necessary to cause desensitization of the i.f. stages, due to the shape of the skirts of the selectivity curve. Similarly, desensitization in the receiver r.f. stage may be caused by signals far removed from the tuned frequency, but requires that the interfering signal be of much greater amplitude before desensitization occurs.

Cross-modulation, another contributing factor to a receiver's two-signal selectivity performance, is caused by the transfer of modulation from an undesired to desired signal. It is

*P.O. Box 60, State College, Pa.

usually caused by the third-order product in the plate (or collector) current characteristics of an amplifier stage. When a receiver is degraded due to cross-modulation caused by strong signals far removed from the tuned frequency, the cross-modulation usually occurs in the first r.f. amplifier stage(s). If the interference occurs at a frequency close to the tuned frequency, cross-modulation may occur in the converter or i.f. stages of the receiver.

Spurious responses, the third phenomena which may cause deterioration of the two-signal selectivity of a receiver, due to the non-linearity of receiver stages, is the result of undesired signals combining with the fundamentals or harmonics of one or more of the receiver's local oscillators to produce a signal which falls at one of the receiver intermediate frequencies. It is possible for even the 50th and higher harmonics of the receiver local oscillators to contribute to this type of interference.

Typical Curves

Now that we have considered the background information necessary for the appreciation of two-signal selectivity, let's look at some measured curves taken on two receivers. Figure 1 shows the single- and two-signal selectivity curves taken on a receiver used in mobile v.h.f. communications, with 40 kc spacing between channels. According to the usual single-signal selectivity curve, the 100 db bandwidth is approximately 60 kc. Many people erroneously assume this means an interfering signal 100 db stronger than the desired signal would have to be within 60 kc of the desired signal before it could cause interference. Actually, all this curve says is that a single signal would drop 100 db in amplitude when detuned 60 kc from the receiver's tuned frequency.

The two-signal selectivity curve is a measure of the ability to receive a desired signal in the presence of a second, undesired signal, and shows that any signal 100 db stronger than the desired signal and within *480 kc* of the receiver tuned frequency will cause interference to the desired signal. This example clearly shows the difference between the single-signal selectivity and the two-signal selectivity of a receiver, in determining the interference-rejection properties of the receiver.

Another example of single- versus two-signal selectivity is shown on figs. 2 and 3. These curves were plotted from measurements made on a general-coverage (0.5-32 mc) military receiver which uses several mechanical filters in the i.f. circuitry to provide various degrees of selectivity. The measurements were taken with the bandwidth set at a nominal figure of 16 kc. Figure 2 is the single-signal selectivity curve, and is obviously determined mainly by the mechanical filter in the i.f. Figure 3 shows the two-signal selectivity curve of the same receiver with all dial and control setting remaining the same. As this two-signal selectivity curve shows,

[*Continued on page 104*]

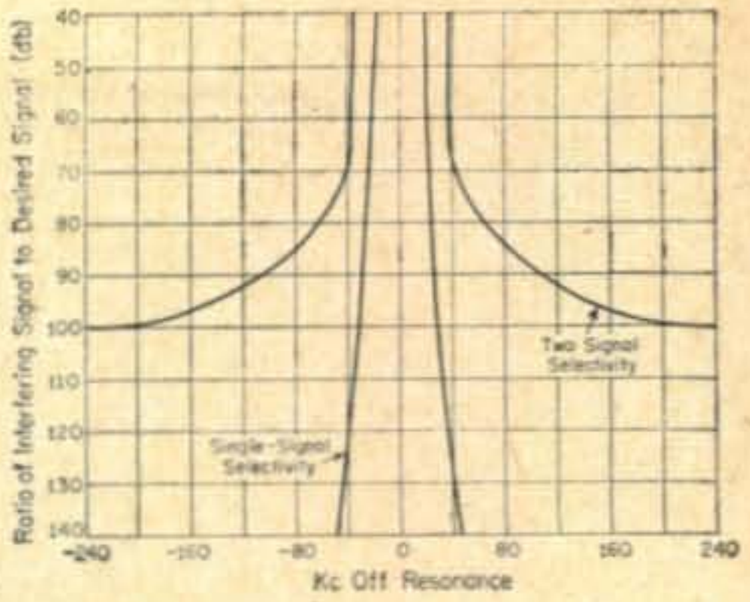


Fig. 1—Comparison of single-signal and two-signal selectivity of a typical v.h.f. receiver.

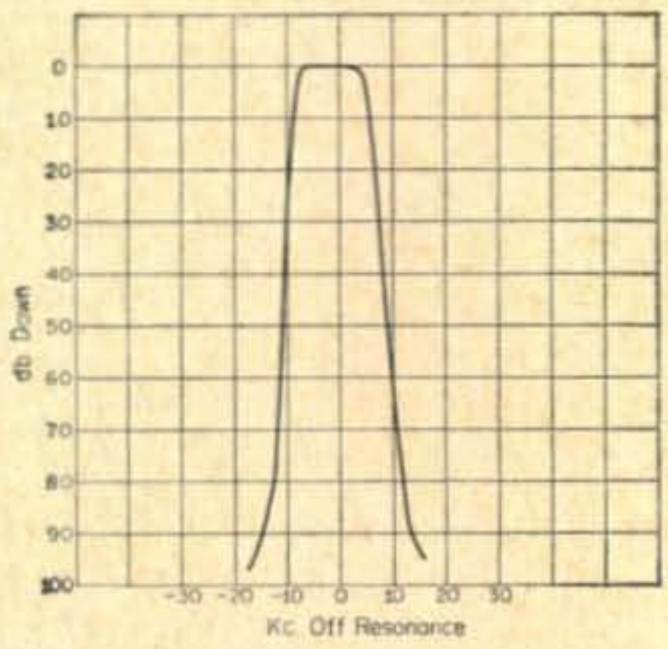


Fig. 2—Single-signal selectivity of a typical h.f. communications receiver.

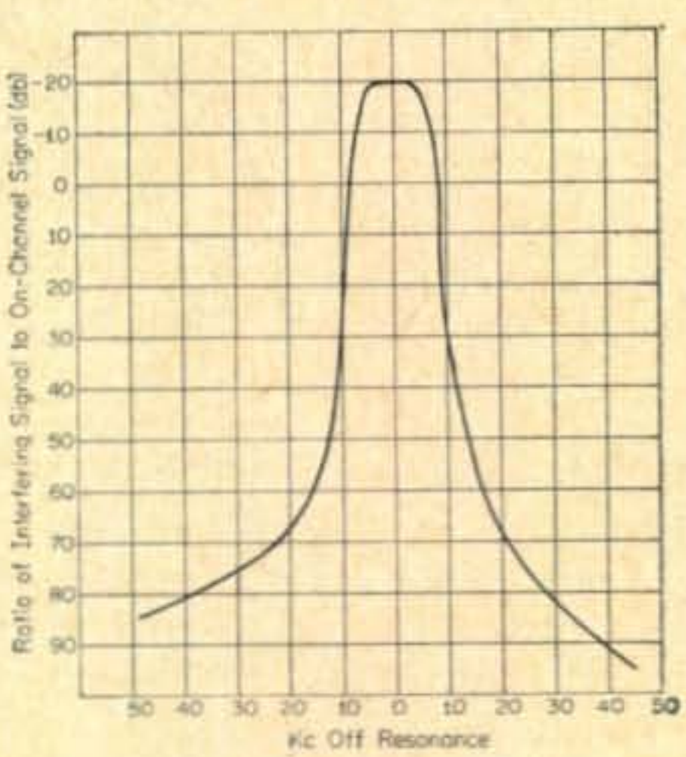


Fig. 3—Two-signal selectivity of a typical h.f. communications receiver.

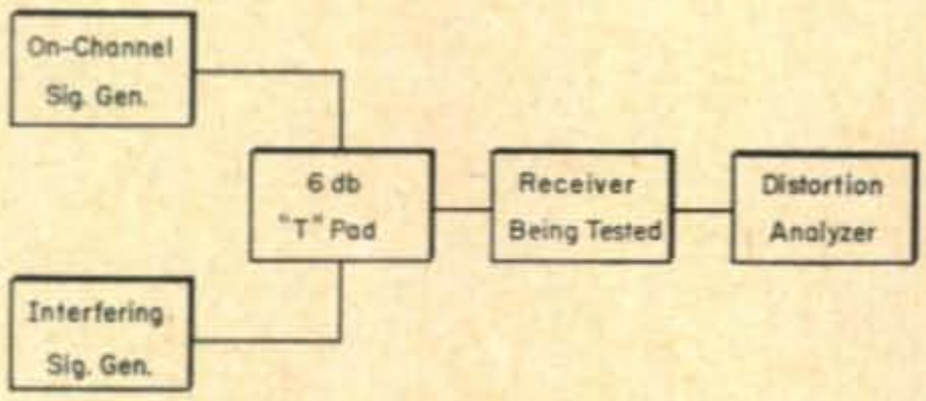


Fig. 4—Equipment set up for plotting two-signal selectivity curves.

How The Coax Phase Detector Works

BY DAVID T. GEISER*, WA2ANU

MANY readers have written asking, "How does the coax phase detector[1] in the January (1962) *CQ* work?" Happily, no one has had trouble making the unit work, but it does seem embarrassing not to fully understand why the meter indication reverses as the transmitter load shifts from capacitive to inductive. Here, in detail, is the theory.

Let us examine the phase angle between the transmitter r.f. voltage and current for each resistive, inductive, and capacitive loads (figs. 1A, B, and C).

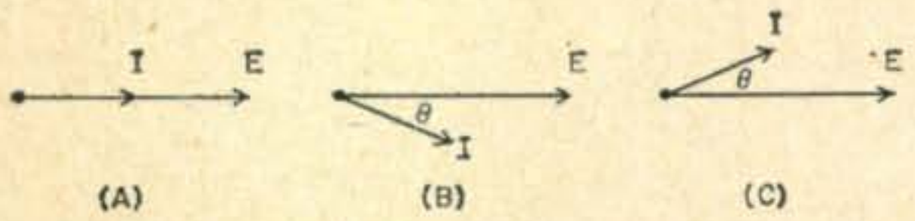


Fig. 1—(A) Phase relations of current and voltage in a Resistive Load; (B) Inductive Load; (C) Capacitive Load.

A resistive load draws current that increases and decreases in synchronism with the applied voltage. Thus, if we draw an arrow whose length indicates the amount of voltage and whose direction shows the phase angle of the voltage, we could draw a "current" arrow directly on top of it (fig. 1A). If the load also has some inductance, the two arrows do not coincide in direction. The current lags (follows in time) the voltage (fig. 1B). If the load has some capacitance, the current leads the voltage (fig. 1C).

Phase is the angle θ indicated between the current and voltage arrows. Zero phase angle means the load is a pure resistance.

Sensing Voltage and Current

Capacitors may be used as voltage dividers. If two *unequal* capacitors are series connected to a source of a.c. voltage, a larger part of the applied voltage will appear across the smaller capacitance. The smaller voltage will appear across the large capacitance. The two capacitor voltages are "in phase with" and add up to the applied voltage (fig. 2A).

Transformers yield output voltage at their secondary terminals when current flows through the transformer primary. In an ideal and unloaded secondary, the output voltage is exactly 90° out of phase with the primary current. Thus, if the transmitter load current flows through the transformer primary, and the secondary is center-tapped, both a voltage leading 90° and one lagging 90° with respect to the transmitter load current may be obtained (fig. 2B).

Voltage from the capacitive divider C_1-C_2 (fig. 2C) may be added to the transformer output voltage to combine the sensed voltage and current. If the transformer is *exactly* center-tapped and the transmitter load is resistive, the developed voltage from terminal 1 to ground (dotted line) is exactly equal to the a.c. voltage appearing between terminal 2 and ground. If these two voltages are rectified and filtered, the d.c. voltages would be equal. A milliammeter connecting the two outputs would show no current, for there is no voltage difference. Actually, to complete the circuit so that rectification can take place, not only the diodes, but also the *RFC*, R_1, and R_2 must be added (fig. 3A).

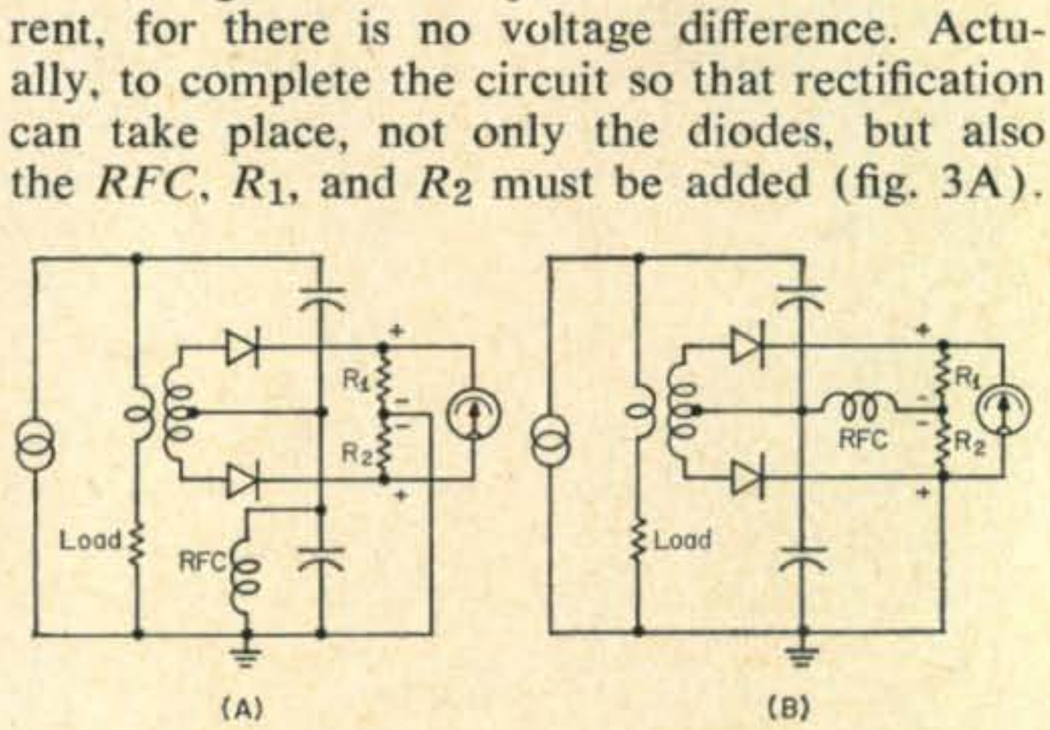


Fig. 3—(A) Practical coax phase detector showing added parts necessary for rectification and the output polarity developed across the load resistors; (B) Circuit re-arranged (Jan. 1962 CQ) giving an output having one leg at d.c. ground potential.

Positive d.c. voltage (with respect to the connection between R_1 and R_2) is developed on each terminal of the meter. These voltages oppose each other. When equal, there can be no current flow.

*Components Engineer, Light Military Electronics Dept., General Electric Co., Utica, N.Y.

[1]Geiser, D. T., "Building and Using the Coax Phase Detector," *CQ*, Jan., 1962, p. 24.

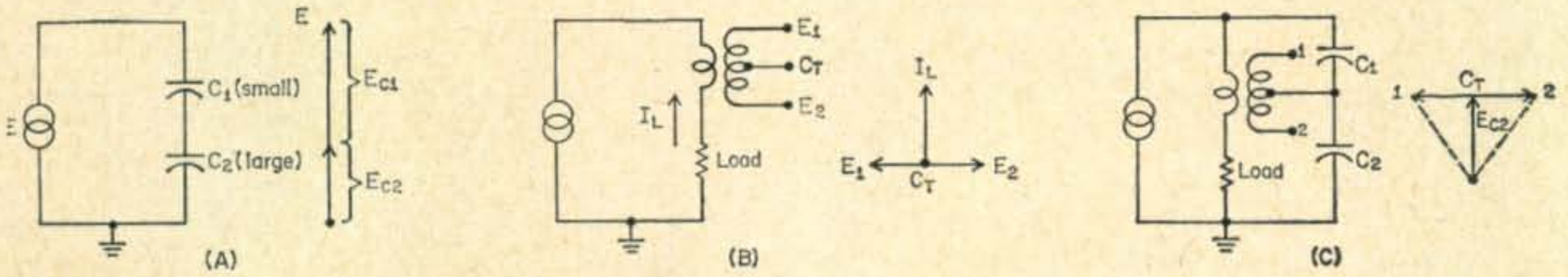


Fig. 2—(A) Capacitive voltage divider and its phase relationships; (B) Curent sensing with a transformer; (C) Combination; with the net voltage outputs shown by dotted lines.

Since there was no d.c. path previously established for the rectifying circuit, we can relocate our d.c. ground for greater convenience as shown in fig. 3B.

Reactive Loads

Reactive loads change the phase angles of the load current (figs. 1B and 1C). This in turn "tilts the T cross-bar" formed by the arrows in fig. 2C. The resulting output voltages, shown by the dotted lines (figs. 4A and 4B), are no longer equal. The d.c. voltages developed across R_1 and R_2 are therefore not equal, and current will flow through the meter in the direction dictated by the larger voltage.

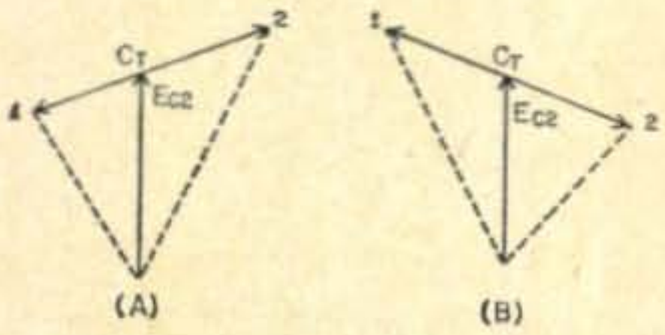


Fig. 4—(A) The unbalance in output voltages (dotted lines) with the leading (capacitive) current in the transmitter load; (B) Same, with lagging (inductive) current.

For small phase angles and constant transmitter voltage output, the amount of meter swing gives some idea of the amount of reactance, but generally it is best to use the meter to indicate only the direction of necessary correction.

The Balance Potentiometer

The relative values of R_1 and R_2 are experimentally chosen by moving the arm of potentiometer R when the bridge is terminated in a known resistive load.

Fixed resistors cannot generally be used for R_1 and R_2 since there will always be a moderate degree of unbalance in the transformer, diodes, and physical layout of the coax phase detector.

The Meter

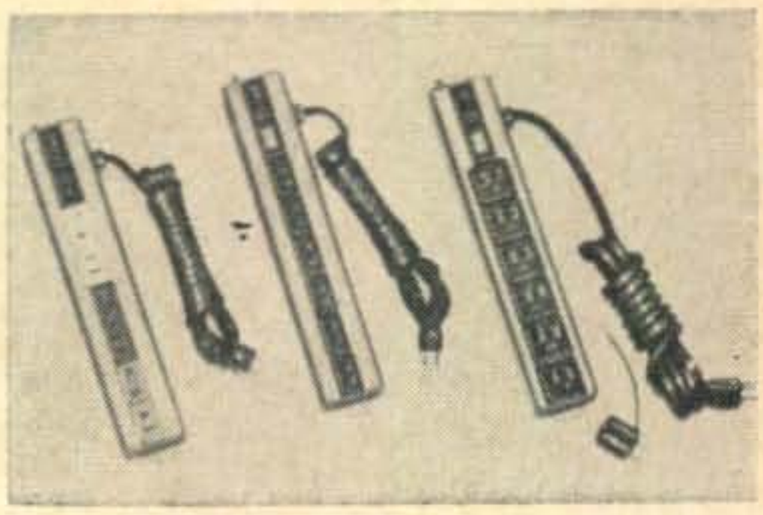
Surplus zero-center meters (100-0-100 μa) are presently available at prices ranging from $2.95 to $5.95. It is not necessary that the scales be calibrated. Meters this sensitive should be shunted with either resistors or diodes, unless initial tuneup is made at relatively low power levels.

Thanks

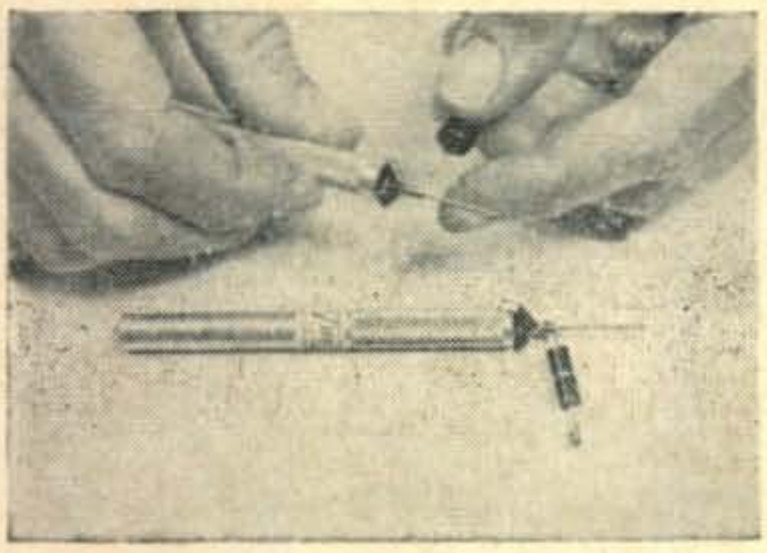
Readers of *CQ*, in the careful phrasing of their questions, were the real authors of this article. As noted in the construction article, nothing here should be considered as more than a partial summary of what is known. ■

New Amateur Products

Power Distribution Strip



WABER Electronics, Inc., Hancock & Somerset Streets, Philadelphia 33, Pa. has available a varied line of power distribution units ideally suited for the ham shack. All units are rated at 15 amps and are fused. The Model 20 has 6 receptacles, a pilot light and a 10 foot neoprene line cord. The Model 24 is similar to the Model 20 except that 3 wire receptacles are used in conjunction with a 6 foot 3 wire line cord. The Model 30 is a selector box containing four sets of color coded switches and sockets, each socket individually switched. All units are available with a push-to-reset circuit breaker at additional cost. Circle A on page 126 for more details.



Twirl-Con

ONE of the cleverest gadgets to cross our desk recently is made by Twirl-Con Tools, 1101 N.E. Street, Edna, Texas. The new tool simply winds wire of various gauges into a tight spiral of proper inside diameter to slip over component leads for easy service work. To replace a component in tight quarters, simply snip off the old resistor or capacitor leaving ¼" leads at the terminal, twirl the replacements' leads and slip it over the ¼" stubs and solder. No more broken and melted wires, sockets, etc.! Available in 3 sizes. For more details on the many uses of the Twirl-Con, circle B on page 126.

Kilowatt R.F. Transistors

BY DONALD L. STONER*, W6TNS

It was in 1948, a short span of 14 years ago, that the transistor was born in the Bell Telephone Laboratories. Little did the inventors realize what they had created and how it would affect business, hobbies and economics.

I am acutely aware that we are living in a marvelous age. Every new day brings news of a development or invention in the field of semiconductors. Progress is virtually "leapfrogging" and many transistor types are obsolete before they reach the market. Strangely, semiconductor theory is often proved incorrect even after it is generally accepted.

From text books we know that high frequency performance is improved when the semiconductor base material is made thin, which reduces the transit time of the current carriers. In addition, the area of the base and emitter junctions are made very small to reduce the junction capacity to a minimum. We do an analogous thing to make u.h.f. vacuum tubes, that is—reduce the transit time and the input/output capacity.

You might think of the transistor as having tiny *R-C* circuits in the input and output leads. The *R-C* circuits act as low-pass filters and thus limit the maximum operating frequency. Anything that can be done to reduce *R* and *C* will increase the high frequency performance.

Reducing the size of the transistor, although it reduces transit time and capacitance, also drops the device dissipation. For this reason it was believed (until recently) that it was not possible to construct a high frequency-high power transistor. The two were simply not compatible. In other words, virtually anything done (of an electrical nature) to the semiconductor device to increase the power handling capacity would reduce the alpha cutoff frequency.

Enter PSI

This entire line of thinking was knocked for a loop a few years ago, when Pacific Semiconductors, Inc., announced production of their *triple diffused mesa* transistors. The industry was told that PSI had been making these transistors for some time, as part of the government satellite program.

*V.H.F. Editor, *CQ*.

The Triple Diffused Mesa

The diffusion technique is the first "secret" to the manufacturing of high power, high frequency transistors. To demonstrate this technique, squirt some ink into a glass of water. What happens? Within a few seconds the water turns dark for the ink rapidly diffuses with the water molecules. Now place the same amount of ink on an ice cube. Don't wait for it to diffuse into the water molecules, however, for the process will take several thousand years for complete diffusion!

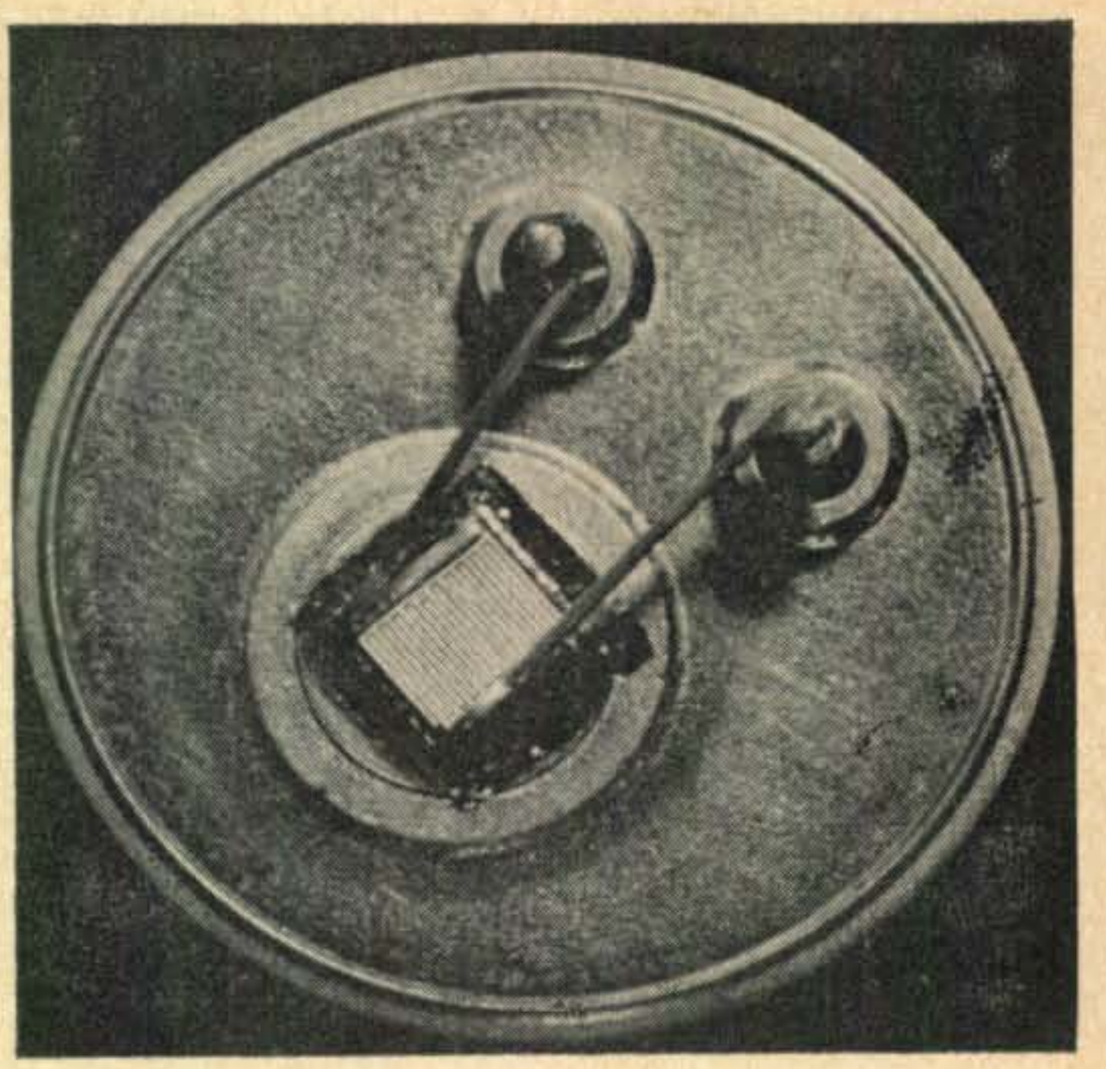
How does this apply to our high power transistor? When the silicon is heated to a high temperature, it reacts much the same as the water. Diffusion is rapid but can be carefully controlled by regulating the diffusion time, heat and environment in order to add exactly the right amount of impurities. When cooled, the material "freezes" and reacts like the ice cube, that is, its characteristics remain constant for a long time.

Why go to all this trouble to make a transistor? First of all, diffusing the base and emitter junctions to the collector greatly reduces the junction capacity. This, as we have seen, increases the high frequency performance of the transistor.

All PSI transistors are constructed on basic building blocks. In this case the block is a dice of silicon about the size of a quarter. This thin wafer is saturated with impurities through back diffusion, the first of the diffusion steps. This N material, which tapers off internally to N+ (due to diffusion) eventually becomes the collector. The N+ material is mounted directly on the header and provides excellent d.c. and thermal conduction characteristics.

When the first diffusion step is completed, a thin controlled layer of P-type impurities is diffused on the N side of the N+ wafer. Following this, the dice is made photosensitive to produce a mask which protects the area where it is desired to retain P material. The remainder of the P-type impurities are then etched off. The retained area eventually becomes the base of the transistor.

The emitter is made in the third diffusion step by diffusing N-type material onto the base structure. The last step before the device actu-



Meet the PSI PT-900 transistor. This silicon transistor which measures only one inch in diameter, has a 125 watt dissipation rating and a calculated alpha cutoff rating of 50 mc. The comb structure, mentioned in the text, is clearly visible.

ally becomes a transistor is to etch completely through the N collector region to set the base and emitter up on a tiny mesa.

Although we have discussed and drawn only a single transistor, it should be pointed out that in actual fact dozens of transistors are constructed on each round silicon wafer. All the processes just described, and many electrical tests of individual transistors, are performed before the wafer is broken up into individual dice.

After separating the dice the transistors are again tested, mounted on a metal header and wire leads attached by thermal compression bonding. Finally the transistors are again tested, capped, tested and sorted into characteristic groups.

PSI makes many different types of triple diffused silicon mesa transistors and the base-emitter structure assumes many different forms, depending on the device application. The higher power transistors employ a "comb structure" base emitter configuration. It has been shown that the majority of mobile carriers are injected from the sharp edges of the junctions. The designer, Mr. Mason Clark, reasoned that a comb structure would provide more edge length and therefore improve high frequency performance. This comb configuration results in carrier injection nearer the emitter, which also has been provided with a long edge. Although the large electrode area increases *C* somewhat, the parallel combs greatly reduce the junction resistance.

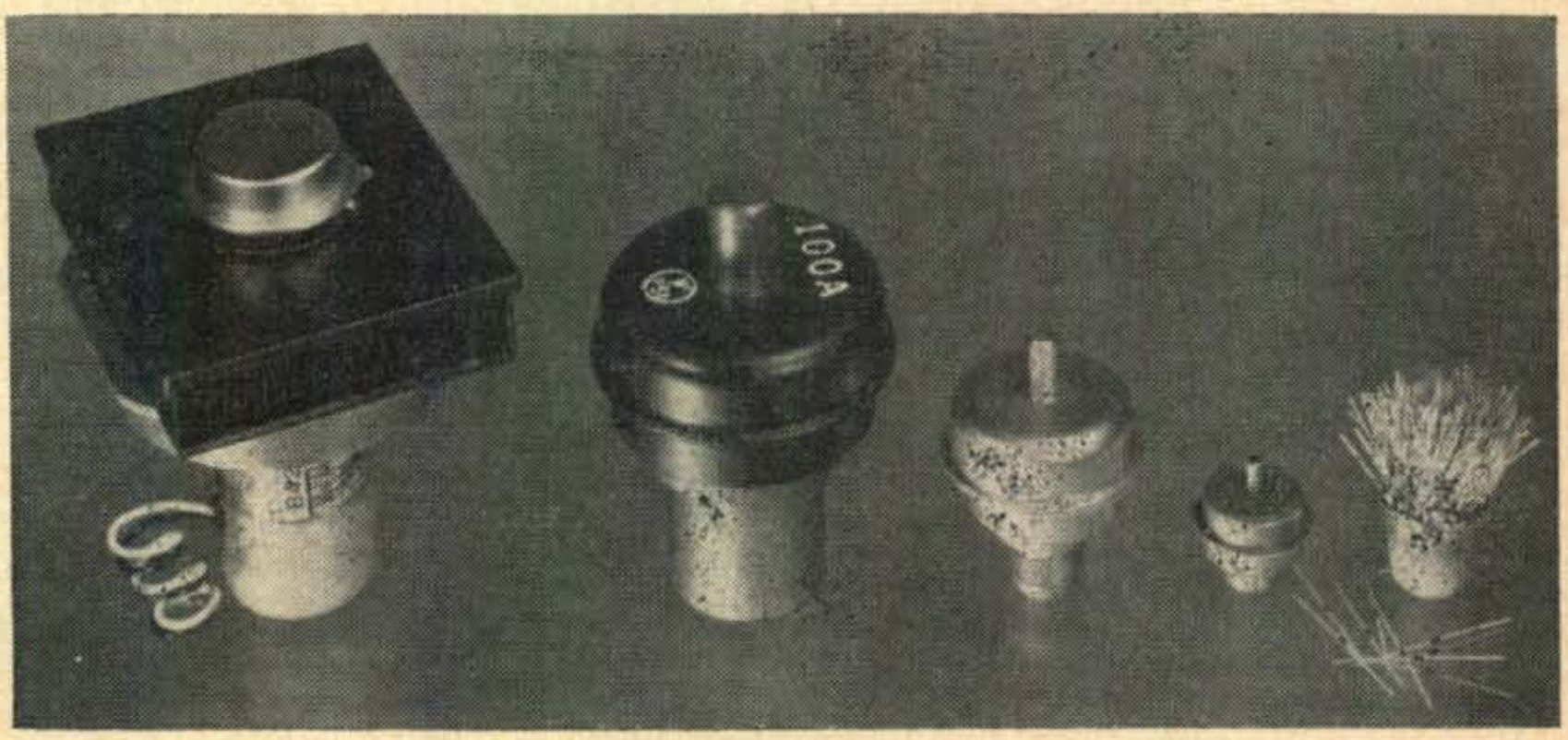
One of the PSI developments, using the comb structure, is the PT-900 and 2N1899 transistors. These amazing units have the following maximum ratings: collector current of 10 amperes, saturation resistance 0.2 ohms, calculated alpha cutoff frequency 50 mc, and 125 watts dissipation. On single sideband you could run several hundred watts p.e.p. to the 2N1899 and it will operate at reduced ratings through 10.

The size of the silicon wafer in these transistors is quite large. The manufacturing technique for these wafers is quite critical and the surface must be free of any imperfections or discontinuities. As an example, you could make 400 small silicon transistors from the same wafer. If the discontinuity ruins five transistors, you still have 395 good ones. However, if the same discontinuity appears in the PT-900 wafer, the transistor may be ruined. Due to the precision work involved in manufacturing such a transistor, you can easily understand why they are so expensive. The price of the PT-900 is $155.00. However, these "brutes" are still made on pilot lines.

Kilowatt Transistors

Earlier, I promised you a kilowatt r.f. transistor, and one you shall have. Let's take a peek in the PSI development laboratories. You don't have to look closely to see the giant 20, 50 and 100 ampere transistors being constructed for the Air Force. Even if you could afford one, don't bother to place an order, for all units are made exclusively for the Wright Air Development Center. These transistors are rated at 400, 800, and 1200 watts dissipation and also feature a calculated 50 mc alpha cutoff

[*Continued on page 102*]



The two devices to the left are 100 ampere, 1200 watt dissipation r.f. transistors, with smaller coaxial versions to the right. The PSI Microdiodes in the thimble (1,000—count 'em) are shown for a size comparison.

DX DX DX DX DX DX DX DX

URBAN LE JEUNE, JR., W2DEC

BOX 35, HAZLET, NEW JERSEY

The following certificates were issued during the period from May 3rd 1962 to and including June 3rd, 1962.

CW-PHONE WAZ

1679	JA1BK	Kiyoshi Mizoguchi
1680	HB9UE	E. Fluckiger
1681	OK1TW	Ing. Havlicek
1682	K6MLS	George G. Stauch, M.D.
1683	W2JAE	Clem Coleman
1684	W2MES	J. Hellmann
1685	VS1FZ	Stanley Read
1686	W7AEA	Max H. Bice
1687	HB9DX	Etienne Heritier
1688	WSLEF	Willie E. Petty
1689	KØLFY	William J. Ovca, Jr.

ALL-PHONE WAZ

148	K6MLS	George G. Stauch, M.D.
149	W1BHP	C. Stanley Knight
150	W5PSB	H. L. Pat Parrish, Jr.
151	W1ORV	Leonard C. Pray
152	W6YMV	Paul E. Friebertshauser

ALL TWO-WAY SSB WAZ

86	KØRDP	George Goodwin
87	W3JTC	Larry Eisler
88	WA6HOH	James M. Hanson.
89	W3MAC	Lewis J. Papp
90	K6ZXW	Ralph Dougherty
91	K6RWO	W. E. Leeder
92	W6BAF	Harold Spaulding
93	K6MLS	George G. Stauch, M.D.
94	VE7IT	L. C. Parkhurst
95	W5PSB	H. L. Pat Parrish, Jr.
96	W1ORV	Leonard C. Pray
97	W3GHD	Robert G. Wilson
98	W5KGX	Robert O. Lowery
99	W7UPF	Don Richards
100	W3KT	Jesse Bieberman
101	ZL2GX	Jock White

CW WPX

322	OE1FF	Frank Friedl
323	VE5JV	Allan Chesworth
324	W9MQZ	Arthur Evans
325	SVØWZ	Sergeant R. Horn
326	W4BHG	James H. Millard
327	K2OUS	Louis M. Minsk
328	VO2NA	Jack Willis
329	W6NUQ	James W. Blackburn
330	K4BVD	Charles K. Epps
331	W7STC	L. A. Killpack, Jr.

PHONE WPX

68	OE1FF	Frank Friedl
69	W9SFR	Steve Hritsko
70	DJ3CP	Dieter Greve

SSB WPX

102	DJ3CP	Dieter Greve
103	W9SFR	Steve Hritsko

WPX ENDORSEMENTS

	Mode	*Total*	*Continent*	*Band*
W9MQZ	CW	350	E	15
W9SFR	CW		E	15-20
W9UXO	CW		E	
DJ3CP	Phone			20
OK3EA	CW		E	
SM5WI	CW		E	80
SVØWZ	CW		E	
VE3JZ	CW		E	

A-Asia; *E*-Europe; *F*-Africa; *N*-North America; *O*-Oceania; *S*-South America.

WPX HONOR ROLL

CW WPX

W2HMJ	651
W5KC	556
W8KPL	553
K6CQM	552
W2EQS	547
W9YSX	544
W4OPM	531
W6KG	528
W2HO	526
K9EAB	515
W1IJB	513
W6WO	511
W2GT	510
SM7MS	510
W8LY	506
K2UKQ	505
G3EYN	503
W2NUT	502
W5LGG	502
W6YY	502
K2CPR	501
W9SFR	501
W1EQ	500
W2MUM	495
SM5CCE	488
YU1AG	482
W8PQQ	481
W9UXO	480
W4HYW	478
G2GM	478
W9GFF	471
W3OCU	466
K6SXA	464
K2ZKU	461
W3BCY	457
W4BYU	456
PAØLOU	451
W3PGB	450
DL1YA	450
W8JIN	449
W8RQ	445
OE1FF	442
W3BQA	437
W8UMR	429
K5LIA	428
OK1MB	428
W3CGS	426
W1EIO	425
SM5WI	425
WØPGI	420
HB9TT	419
OK3EA	419
W8IBX	416
WØMCX	416
W5AWT	412
W5DA	412
K5LZO	411
W2PTD	411
W4DKP	410
W1CKU	408
K4JVE	407
W5AFX	407
W2KIR	405
W4YWX	404
DL3RK	403
JA2JW	403
VE6VK	403
G3HIW	402
PY4OD	402
K2PFC	401
IT1TAI	401
W2RA	400
VK3KB	400

PHONE WPX

W8WT	548
G3DO	538
W9WHM	510
CT1PK	483
W9YSQ	471
MP4BBW	454
PAØHBO	453
W6YY	448
VK6RU	421
PZ1AX	413
G8KS	408
OE1FF	382
TG9AD	381
DL6VM	376
PAØSNG	369
W1UOP	368
K9EAB	366
W8UMR	363
SM3EP	361
W5ERY	358
W8JIN	356
W9UZC	356
DL3TJ	354
PY2CK	354
5A5TO	353
LA5HE	351
G3DO	311
K4PUS	305
W2HXG	294
W6YMV	278
K2MGE	273
WØCVU	271
K2TDI	264
DJ3CP	260
W2YBO	257
W3VSU	256
UR2AR	255
TG9AD	252
W1ORV	250
G3NUG	250

SSB WPX

W4OPM	400
MP4BBW	392
T12HP	356
K9EAB	350
PZ1AX	345
G8KS	341
W3MAC	329
W2VCZ	320
W8PQQ	315
HB9TL	315

MIXED WPX

W8JIN	605
W4OPM	595
W3OCU	588
G3DO	568
W8WT	568
W8UMR	500

Okinawa Amateur Radio Club President, Frank, KR6-LJ. Frank is active DXer, holding forth from such places as KG1AQ, KL7AGM, and K1CQP in the past few years. Frank's brother is presently KG1BO. *(Tnx KR6LJ).*

Here There and Everywhere

EP Iran: EP2AT is now QRT in Tehran—new call and QTH will be K7GMZ/Ø or WØQOJ, 10 E. Jefferson, Colorado Springs, Colorado. Bob has answered all QSL cards which have been received. If anyone has not received an EP2AT card, another card to the above address will be answered in all cases. Bob should be on the air again from K7GMZ/Ø or WØQOJ about the time you are reading this.

JA Japan: The following is from JA1ACA via the NCDXC: There are about 15,000 amateur stations in Japan. There are four classes in Japanese Amateur stations as shown below.

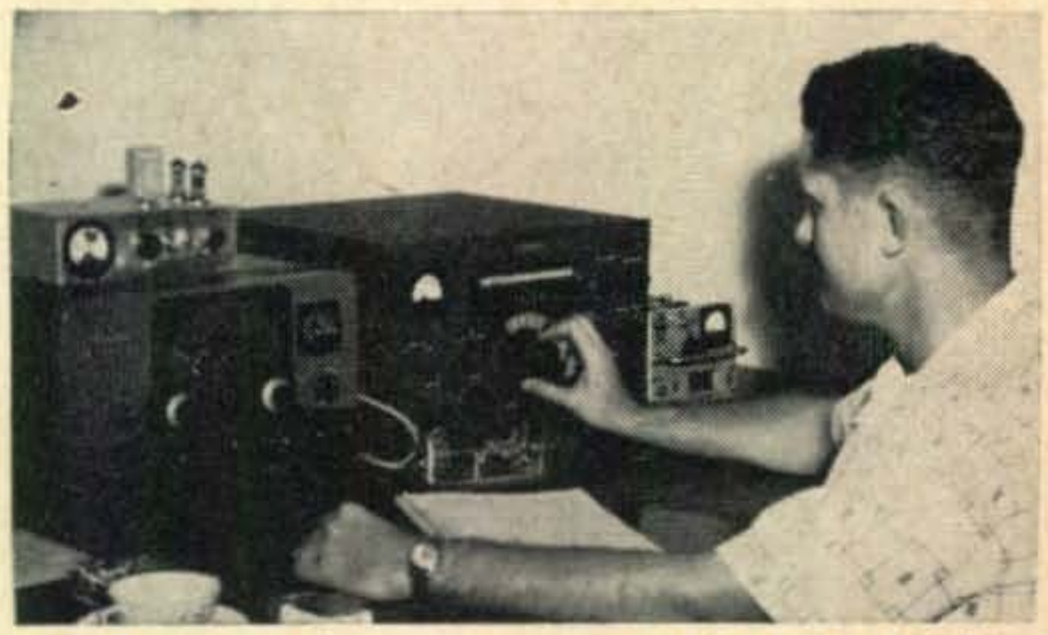
1st Class—All Bands, A1, A3, A3a—500 watts.
2nd Class—All Bands, A1, A3, A3a—100 watts.
C.W.—All Bands except 14 mc, A1 only-10 watts.
Phone—All Bands except 14 mc, A3 only10 watts.

MP4 Qatar: John Garrett left Houston enroute to Qatar and will be on the air beginning 1 June for three or four months, then to several other exotic places to be announced later. He has shipped a new Collins 32S-1 and 75S-3, a TH4 beam and a 45 foot crank up tower. He will operate c.w. between 14070 and 14080 and s.s.b. on 14120 and will listen for s.s.b. on 14320 daily, (early morning his time CST plus 10 hours) via short path, and late afternoon, his time, via long path. QSL via Ray Geophysics Ltd. T-567, c/o Q.P.C. Umm Said, Qatar, Persian Gulf. *(Tnx WGDXC)*

PYØ St. Peter & St. Paul Rocks: A Brazilian expedition to St. Paul & St. Peter Rocks is on the agenda. The Brailian Navy is being contacted for transportation. There is an abandoned lighthouse on these rocks which should provide a passable "shack" and a nice antenna support. See pg. 591, Nov. 1960 *National Geographic* for a picture taken from the *Triton*. *(Tnx WGDXC)*

PX1 Andorra: G5RV will be active from PX-land as PX1RV with c.w. and s.s.b. starting Aug. 3, ending Aug. 17. Freqs. 14120 to 14140 kc, listening own freq. for Europe and around 14300 kc for others. Second op will be F7GX, call PX1GX, active with 50 watts a.m. *(Tnx VERON)*

PK Indonesia: K3HVN/PK has left Indonesia for the U. S. without regaining permission to



KR6ML, Larry, Okinawa Amateur Radio Club Publicity Manager. Larry has keyed his Johnson Ranger/75A-4 combo to 117 worked, 97 confirmed. *(Tnx KR6LJ).*

Okinawa Amateur Radio Club QSL Bureau with KR6-NB, Jerry, sorting incoming cards *(Tnx KR6LJ).*

KR8AU, Kiyoshi, who is workable on 40 c.w. His transmitter is ten watts in the little cabinet behind his head. Kiyoshi is a Senior at Koza High School, Okinawa. *(Tnx KR6LJ).*

WPXers will be interested in seeing what WU1ITU looks like. There's another rig just like this one too. L. to r. are: OK1WI; J. Gayer, President of the International A.R.C.; HB9AAB; and HB9SI, ex-K2UN. The station is located in a new building at the International Telecommunications Union in Geneva.

operate; however, W9BND has taken over the equipment and rumors have it other civilians will be on from there.

VP4 Trinidad: The S.T.A.R.S. second exhibition of amateur radio attracted large crowds to San Fernando's Technical Institute recently. The shows' features included three rigs, display of home-built equipment, TV, film show, demonstrations of components and circuits, and VP4PL's attractive display on ham radio in general.

Attention-getter in the home-brew department was VP4KR's KWM-2-like transmitter and outstanding example of mechanical excellence matched with first-class chassis and cabinet work.

The mobile-emergency run in cooperation with St. John's Ambulance Corp. had several hundred spectators actually believing a member of the audience had received severe shock.

VP4MM, Trinidad's police radio specialist, set up a police rig at the show. Walkie-talkies and radio-microphones loaned by the police aided the demonstrations and facilitated crowd control.

VK9 Cocos Keeling Island: "I am employed by the Dept. of Civil Aviation (Australian) as a supervising radio technician. I have been on the air for just under 2 months at this address although licensed since 1948 as VK6LA. I have not been very active except for about 12 months some 6 years ago.

This is VU2MD, who is one of the most prolific certificate hunters in Asia. Dady holds 58 awards from 23 different countries. The rig runs 75 watts and the recent acquisition of a 20A permits s.s.b. operation.

"I will be at Cocos for another 18 months. At present I am using about 30 watts input and operating 14 mc only. The transmitter is home brew and the receiver a Drake 2-A. The antenna is a dipole about 20 feet high between 2 coconut palms.

"I am afraid the job here keeps me pretty busy. I am on call 24 hours although, fortunately, the airport is usually closed at night and calls are few. From the ham aspect, I am very much hoping to buy an American transmitter within the next three to four months and operate all h.f. bands all modes. At present, I am fingering thru the catalogs trying to find something suitable and not too expensive. . . . I may be limited to dipoles, but I'll at least be on the air.

"There are no other hams on Cocos at present and I do not know of any others who are definitely coming here. Best wishes, Lionel/VK9LA." *Thanks to W2DGW and the NEDXA for the above letter*

VR3 Christmas Island: The following letter from W6AFI should help to clear up some of the confusion which surrounds the QSL Managers for the VR3 boys. "At present I am QSL Manager for some of the hams now active on Christmas Island in conjunction with present activities near that Island. When this project was first started, the British authorities gave permission for three stations to operate. The permission was given to the three organizations who had the largest personnel on the Island. No call letters were issued at that time and for several weeks starting the 24th of April each ham who operated one of these stations used his own call plus /VR3. At various times there were six or seven calls all signing /VR3 but coming from these three stations. On May 17th, these stations received their British calls which were VR3H, VR3P and VR3S. The group I am connected with was issued VR3H and was made out to W6GMQ, who is Ted Hamm. Prior to this time, the same station used the calls W6GMQ/VR3, WA6WQM/VR3 and W6CLI/VR3, depending upon who was operating the station. I am QSL Manager only for these four stations and all QSLs for these stations should be sent to me at the above address. A s.a.s.e. or IRC should be enclosed for direct reply and all other cards will be answered via bureaus as time permits. VR3H operates on 15 and 20 both c.w. and s.s.b. using a KWM-2, 75A-4 and a Telerex tri-band beam. Operating frequencies are 14,335 or 14,033 kc and 21,435 or 21,033 kc. No calls will be an-

ewered on frequency, but those 5 to 10 kc higher will be answered.

"The only British station, VR3L, has been inactive since last November until recently when two new operators arrived. Their QTH for QSLs is: VR3L, Christmas Island Amateur Radio Club, B.F.P.O., 170, c/o P.M.G., Honolulu, Hawaii.

To my knowledge, this is the first time that the British Government has issued amateur operating privileges to American citizens since shortly after WW II. These three licenses are made out to individuals, not the organizations that they represent. So this might be the first step toward reciprocal licensing between the U.S. and Great Britain and it might be good ammunition to use in this direction."

VS4 Sarawak: VS4RS needs Vermont, Connecticut, Delaware and New Hampshire for his WAS and would appreciate it if stations in those states would watch for him around 1330 GMT, 14060 kc.

VS9 Kuria Marie: VS9AAA and gang will DXpedite to the Island of Kuria Maria, some 600 miles from Aden, with a Kamaran-type RAF ham expedition in September or October. Kuria Marie is administered from Aden and will count as a new one.

ZB1 Malta: The following is from G3PEU, ex-ZB1BW. "I am now back in England and judging from the pile of QSLs, anyone would think I had been in Malta for a two-year tour instead of 3½ weeks!

"Well, a few statistics about my 22 days with the medium-rare-s.s.b. call sign—Over 1000 QSOs with 101 Countries in 32 Zones with 81 countries and 150 prefixes covered on 2×SSB.

"DXCC was achieved in 21 days 8 hours 20 minutes. Now all I need are the cards. I met over 400 W/Ks, many of whom I had spoken to from G-land and I hope to talk to them again when the piles of cards have been reduced and I get on the air again. Final note, Urb . . . many U.S.A. stations have sent direct QSLs with an IRC and ask for Airmail direct replies. Please pass it around that it costs 3 IRCs to Airmail a card from here and I can't afford the difference for 400 cards, as it amounts to about $45.00. With thanks and very 73, Gerry."

This handsome looking couple is none other than Mila and Ludvik, ex-JT1YL and JT1AA, who should now be operating as OK1KX and OK1KW in Prague. They have recently returned from an extended stay in Iran where, unfortunately, they were unable to obtain licensing permission. *(Tnx W3LE).*

Harry, OK3EA, is well known on any c.w. band. The rig runs between 150 and 200 watts input. Harry is a doctor in his home town of Bratislava. Recent goodies worked include VU2US/AC5 and VQ9AA.

Letters

The following letter from W1TYQ/HZ to WA6TGY appeared in the NCDXC *Bulletin*. "The Air Force has officially turned the Dhahran Air Base over to the Saudi Government. Hamwise, it means that HZ1AB is still here under the training mission. W8GCN and I are the only old-time hams left there. There will be 3 or 4 new hams working the station. Guess what this means is 8GCN and I will be the only c.w. men left; hi! At least the station will still be active. Otherwise HZ-land would soon become a rare spot.

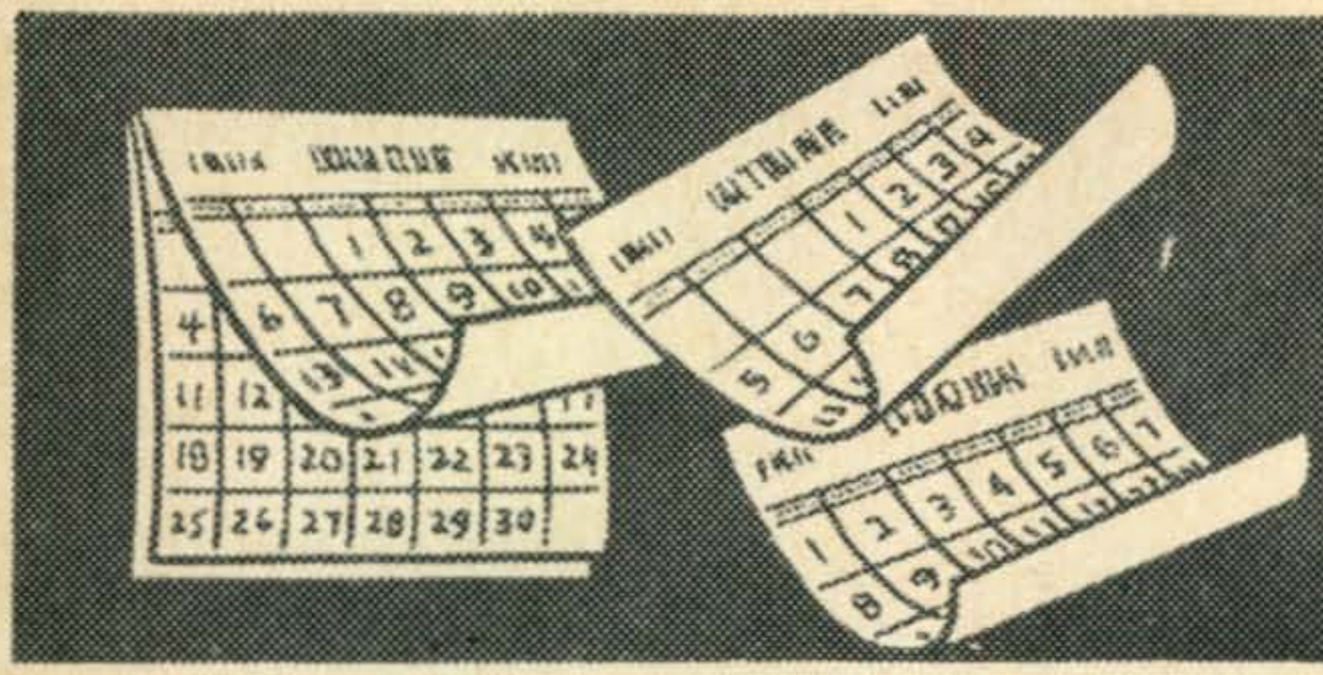
"The British in Bahrain issued me MP4BDL (Bahrain), QAV (Qatar), MAM (Muscat) and TAQ (Trucial Oman), but I haven't had a chance to use any of them yet. Doubt if I'll do much in that direction before next winter as I'll be coming to the U.S. on vacation during July, August and September. There seems to be some rumors about 9K3TL/NZ operation. As far as I know it is just rumor. I have no intention of driving up there unless there are two cars. Last time I made it alone, I was lucky and didn't have any trouble, but if you had a break down, you could well be there a month before anyone would find you. Flying time from here is only an hour *but* the only flights are occasional business flights by the company. I have to ask to fly any trips going up there, however, 95% of them are up-and-back the same day. The best hope is that someone will have to spend several days there on business, in which case I plan on going along. That would give me a chance to do a little operating. Trouble is our flying schedules are on a day to day basis so there is no way of letting anyone know in advance."

Certificates

WAG (Worked All Goose) Award

Amateurs in the U.S. and Canada must QSO

[*Continued on page 100*]



CONTEST CALENDAR

FRANK ANZALONE, W1WY
14 Sherwood Road, Stamford, Conn.

ANTICIPATED CALENDAR of EVENTS

August	11-12	WAEDC C.W.
August	18-19	WAEDC Phone
August	25-26	JARL DX C.W.
*September	1- 2	LABRE C.W.
*September	8- 9	LABRE Phone
September	8- 9	PERUANO C.W.
September	8- 9	Ohio W.W. DX
September	15-16	PERUANO Phone
September	15-16	SAC C.W. DX
September	22-23	SAC Phone
*September	22-23	MARC VE/W
September	29-30	(Open date)
October	6- 7	VK/ZL Phone
October	13-14	VK/ZL C.W.
October	13-15	ARRL CD C.W.
October	20-22	ARRL CD Phone
October	27-28	CW WW DX Phone
October	27-28	RSGB 7 Mc Phone
November	3- 4	RSGB 7 Mc C.W.
November	10-11	ARRL SS
November	17-18	ARRL SS
November	24-25	*CQ* WW DX C.W.
December	1- 2	RSGB 21/28 Phone
*December	1- 2	OK DX C.W.

DARC WAE

C.W.

Starts: 0000 GMT Saturday, August 11th.
Ends: 2400 GMT Sunday, August 12th.

Phone

Starts: 0000 GMT Saturday, August 18th.
Ends: 2400 GMT Sunday, August 19th.

The 8th annual European WAE DX Contest is being held in August instead of the usual January date. The DARC explains this change was made because of the reduced sunspot activity, with the hope that conditions would be more favorable at this time of the year, especially on the higher frequency bands. It will also be noted that a phone week-end has been added this year. Rules are the same for both contests except that the QTC traffic does not apply to the Phone section.

The object of the contest, as in the past, is for non-European stations to contact as many European stations as possible on all bands. *(Note the WAE country list.)*

1. Use all band, 3.5 thru 28 mc.

2. The usual six-digit serial number, RST report plus a progressive three figure QSO number starting with 001.

3. Each exchange of serial number will count one point, except on 3.5 mc where it counts two points.

4. The same station can be contacted once on each band.

5. The multiplier for non-European stations is determined by the number of European countries worked on each band.

6. European stations will use the latest ARRL country list to figure their multiplier. In addition, each call area in the following countries will also count one point. CE, JA, PY, VE/VO, VK, W/K, ZL and ZS. Also UA9 and UAØ count separately.

7. The final score is the total QSO points plus the QTC points, if any, multiplied by the sum of the country points on all bands.

QTC Traffic

Additional point credit may be realized by taking advantage of the QTC traffic feature.

A QTC is a report of a confirmed QSO which has taken place earlier in the contest and later sent back to a European station.

It can be sent only from a non-European station to a European station. The general idea being, that after a number of European stations have been worked, a list of these stations can be reported back during a QSO with another station. An additional one point credit can be claimed for each station reported.

1. A QTC contains the time, call and QSO number of the station being reported *ie:* 1200/DJ3KR/123. This means that at 1200 GMT you worked DJ3KR and received his number 123.

2. Only a maximum of 10 QTCs per station, per band, are permitted, although several contacts with the same station are permitted in order to complete this quota. However only the original contact with any one station has QSO point value.

3. A QSO can be reported only once and not back to the originating station, even though that contact was made on another band.

4. Keep a uniform list of QTCs sent in your log. *ie*: QTC 3/5. This means that this is the 3rd series of QTCs sent and that 5 QSOs are being reported in this one.

Classification

1. Scoring will be determined on All Band operation. There will be no single band awards.

2. However entries *can* be made for single

*Events from which we have not yet officially heard. Dates are tentative.

During a recent excursion to the Plattsburg A.F.B. (N.Y.) Radio Club by our own W1WY, this avid group of amateurs was snapped. Bottom row: l. to r. Don, WA2JJY; George, WA2WDW; Eleanor, WV2UJI; Jim, K4RPQ. Middle row: Jim, K4UKX; Frank, WA2KUL; Bernie, K1BVI; Frank, W1WY; Bob, K2TLJ; Susie, WA2FTM; Roby, WA2JOI. Top row: Chuck, WA2GCH; Mel, WA2IER; Joe, K4RRX; Lynn, WA2DAC; Audie, WA2PKR; John, K2GJJ; Art, WA2SNW. Carl, WV2-VYG present but not in photo. *(Photo courtesy T/Sgt. Pete Brown).*

operator and multi-operator stations. A club station being operated by only one person during the entire contest period may be entered under the single operator classification.

Awards

1. Certificates will be awarded to the highest scorer of each country and country/district as indicated under No. 6 in the rules.

2. Continental winners will be additionally honored. And 2nd and 3rd place certificates will also be awarded in areas where sufficient participation warrents.

Endorsements for WAE certificates will be given for contest contacts providing of course that the log of the requested station has been received by the DARC. This request will not be honored until after the contest results have been announced.

It is strongly recommended that you use the official DARC log form. Time is very short but your request with 5 IRCs to the DARC might get them to you in time by Air Mail.

Mailing deadline for your contest reports is October 15th and your new contest manager is Dr. H. G. Todt, DL7EN, Chlodwigstrasse 5, Berlin-Tempelhof, Germany.

WAE COUNTRY LIST

CT1, CT2, DL/DJ/DM, EA, EA6, EI, F, FC, G, GC, GD, GI, GM, GW, HA, HB, HE, HV, I, IS, IT, LA, LA/P Bear Island, LA/P Jan Mayen, LA/P Spitzbergen, LX, LZ, M1, OE, OH, OK, ON, OY, OZ, PA, PX, SM, SP, SV, SV Rhodes SV Crete, TA/European, TF, UA/UW1 through 6, UB/UT, UC, UN, UO, UP, UQ, UR, UA Franz Josef Land, YO, YU, ZA, ZB1, ZB2, 3A, OHØ, GM Shetland Island.

JARL DX

Starts: 1000 GMT Saturday, August 25th.
Ends: 1600 GMT Sunday, August 26th.

This is the 3rd annual All Asian DX Contest held by the JARL. Amateurs located in other continents are invited to work as many Asian stations as possible during the 30 hour contest period. It's a c.w. contest only and you can use all bands, 3.5 through 28 mc.

Type of Competition

1. Single band, Single operator.
2. Multi-band, Single operator.

(No multi-operator category.)

Serial Numbers

1. For OM station. Five figures, RST report plus two figures denoting your age. (How do you denote 39 plus?)

2. For YL stations. Five figures, RST report plus the two figures 00. (Zero Zero)

Points and Multiplier

1. For non-Asian stations. One point per contact and a multiplier of one for each Asian country worked on each band.

2. For Asian stations. One point per contact and a multiplier of one for each non-Asian country worked on each band. Using the DXCC and WAE country lists.

Scoring

1. Score for each single band is the total contact point on that band multiplied by the total number of countries worked.

2. The multi-band score is total of contact points on all bands multiplied by the sum total of the countries worked on all bands.

Awards

1. Certificates will be awarded to the highest scorer on each single band in each country.

2. And to the three highest scoring operators on all bands in each country. (Once again I must insist that in large countries such as the USA, Canada and etc., awards should be made on the basis of call districts or at least Zones. A look at the JARL scores in last month's CALENDAR will prove my point.)

3. In addition, a Cup will be awarded to the highest scoring operator on all bands in each continent.

All logs must be postmarked not later than September 30th and should be mailed to: The J.A.R.L., Att: Contest Committee, P.O. Box 377, Tokyo Central, Japan.

ADXA Country List

Aden, Afghanistan, Andaman and Nicobar Is., Asiatic Russian S.S.R., Azerbaijan, Bahrein I., Bhutan, Bonin and Volcano Is., Burma. Cambodia, Ceylon, China. Cyprus, *Damao*, Diu, Formosa. Georgia, *Goa*, Hongkong, India, Iran, Iraq, Israel, Japan (Japanese nationals only) Jordan, Kamaran I., Kazakh, Kirghiz, Korea, Kuwait, Laccadive Is., Laos, Lebanon, Macau, Malaya, Maldive Is., Manchuria, Mongolia, Pakistan, Palestine, Qatar, Ryukyu Is., Saudi Arabia, Sikkim, Singapore, Sultanate of Oman, Syria, Tadzhik, *Thailand*, Tibet, Trucial Oman, Turkoman, Turkey (Asian), Uzebek, *Viet Nam*, Yemen.

(NOTE: Armenia, UG6 not listed above is also in Asia. Thailand and Viet Nam are on the USA banned list. Damao, Diu and Goa listed above were deleted from the ARRL, DXCC list as of Jan. 1st 1962.)

[*Continued on page 108*]

sideband sideband sideband

SIDEBAND

IRV and DOROTHY STRAUBER
K2HEA/K2MGE
12 ELM STREET, LYNBROOK, NEW YORK

SSB DX HONOR ROLL

ΓI2HP	262	WØUUV	215
VQ4ERR	261	K6ZXW	215
W8EAP	260	WØCVU	210
W8PQQ	256	W2VCZ	203
W2ZX	252	W2VZV	201
HB9TL	250	G8KS	201
W6UOU	249	W2YBO	201
W2FXN	248	K5MDX	201
PY4TK	245	K1IXG	200
WØQVZ	241	DL1IN	200
K9EAB	241	W1AOL	200
K4TJL	237	I1AMU	200
K8RTW	235	KØCTL	200
W2JXH	233	K4PUS	198
MP4BBW	232	K6MLS	196
K2MGE	231	W3VSU	188
ON4DM	230	PJ2AA	186
W6PXH	229	K2FW	182
W6RKP	226	W6EKZ	181
W6WNE	223	W6YMV	177
W1LLF	221	K4AJ	176
W3MAC	220	W7DLR	176
W5IYU	220	WØPGI	175
W3LMA	219	WA6HOH	175
PZ1AX	218	W9EXY	171

FROM time to time, we receive anguished letters asking why the operator's call has been left off the Honor Roll. We hasten to assure our friends that it is simply a matter of practicality and fairness. Due to space limitations, the Honor Roll contains only fifty calls—those of the most active sidebanders in the world. It has been our announced policy that we must hear from an operator at least every three months, advising of any new DX confirmed, so that we know that he is still interested in being part of this elite sideband group.

CQ SSB STICKERS AND CERTIFICATES

Worked 200
I1AMU KØCTL
W1AOL

Worked 175
W7DLR WA6HOH
W6YMV

Worked 125
K6VVA

Worked 100
K3COW K5AWR
W9CMC SM5BPJ

Worked 75
OE1FF K4BMS
UF6FB WØMCX

Worked 50
W5EJT K2DQI
WA6ESB KØIFL

If we were to retain all the calls of those who achieved a large total and then, for various reasons, lost interest in DXing, our Honor Roll would be a very static and unrealistic appraisal of current sideband DX achievement.

Confirmation listing forms are available from the SIDEBAND editors at the above address upon receipt of a self-addressed, stamped envelope. Keep up-to-date with your sideband activities and help us keep the *CQ* Sideband DX Honor Roll a true reflection of the achievements of the world's top sidebanders.

Sideband Suppression

Now and again we come up against a question about sideband that makes us wonder how such an important point has been overlooked in explanations of s.s.b. signal generation and suppression. After the signal leaves the balanced modulator it goes to the most critical part of the whole system—the sideband filter. The signal leaving the balanced modulator is a double sideband suppressed carrier signal and of very little use to a single sideband rig. It is in the sideband filter that the unwanted sideband is suppressed.

Assuming a 50 kc carrier signal from the

There were only five active sidebanders when this large group photo of Southern Rhodesian hams was taken: Standing far left, ZE4JC; fifth from left, ZE1JT; center, Molly, ZE1JE; and far right, ZE6JA; and seated front row, fifth from left, ZE5JJ. *(Photo ZE6JA)*

carrier oscillator, the audio signal from the speech amplifier and the carrier signal cancel each other out in the balanced modulator and the output of the balanced modulator consists of two sets of frequencies; one from 47 to 50 kc and the other from 50 to 53 kc. To suppress the unwanted sideband we make use of electrical or mechanical filters; the Burnell and McCoy filters are examples of the former, the Collins mechanical filter a prime example of the latter. How these filters work to suppress the unwanted sideband is our subject.

Each of these filters is designed to pass a band of audio frequencies approximately 3000 cycles wide (depending upon its design characteristics). For lower sideband operation, the double sideband signal is introduced into the filter in such a manner that the center frequency (50 kc in this illustration) is positioned in the bandpass about 20 db down on the slope of the filter bandpass curve.

To separate the desired 47 to 50 kc or lower sideband from the undesired 50 to 53 kc upper sideband (or vice versa), the filter must have a low attenuation for the 47 to 50 kc, a very sharp slope in the vicinity of 50 kc and a very high attenuation to the frequencies between 50 and 53 kc.

Changing sidebands is accomplished by switching crystals or by retuning an electrical circuit to change the carrier oscillator frequency to position it on the upper or lower slope of the filter.

What has been said about the 50 kc filter also holds true for the 455 kc filter; filter action is exactly the same only the frequency has changed.

The Collins mechanical filter is unique in that it changes electrical energy into mechanical energy and then back into electrical energy again. This filter consists of an input transducer which converts the electrical input into mechanical oscillations, metal discs which are mechanically resonant, coupling rods which couple the metal discs and an output transducer which converts the mechanical oscillations back into electrical oscillations.

A Different Concept of Sideband

A note from C. McCormick, K8DFR, of Lansing, Michigan, suggests that we acquaint you with an article on s.s.b. generation in a British magazine, *Electronic Technology*, Vol. 39, No. 5, May, 1962, Pages 168-171, which he has found new and different. The article, "Single Sideband Generation—A New Principle," by W. Saraga, contains eleven detailed references, a block diagram, and four pages of description which bring out many unusual viewpoints including the point that the unwanted sideband is not generated so it does not have to be filtered out or phased out. Carl suggests that you look up the magazine in your local university engineering library or other large engineering library and read the article for yourself.

The neat and complete station above belongs to Ivar, SM5WJ and consists of the GSB-100, SX-101, homebrew 450 w. linear amplifier and homebrew a.m. rig.

What About S.W.L.'s?

From time to time, most of us receive reports from short wave listeners, all of whom take their monitoring seriously and from whose ranks come the amateurs of tomorrow. Since we had been puzzled as to how to acknowledge an s.w.l. report, we asked Garry, VE3-7554, of Atwood, Ontario, Canada, to pass along a few hints that would clarify the matter. An s.w.l. would appreciate your personal QSL, verifying the contact he monitored, with a notation as to the date, mode, station worked, power used and including your signature. However, in lieu of your own QSL, any verification of the report is welcome and should be sent as a courtesy, particularly if an s.a.s.e. or IRC is included. S.w.l.s have their own intra-hobby competition and keep lists of how many countries they have heard and had "confirmed" by verifications. Let us extend the courtesies of amateur radio to our fellow hobbyists—the short wave listeners.

Sideband Around The World

Les, ZS6PC, asks that we point out to those who worked his call during March 1 to 4, 1962, that they are actually in line for a new country confirmation. During this period, Les was operating ZS8 from Basutoland; upon receipt of a self-addressed envelope and the necessary IRCs, Les will be pleased to confirm

As the only active sideband in Angola, Jo, CR6CA, always creates quite a stir when he appears on the bands. Jo is a man of many interests including DXing, ragchewing, certificate hunting, math problems, and amateur magic. *(Photo K1IXG)*

"Buggy" Burgoyne, (right) VQ2AB, was the featured speaker at the May meeting of the Franklin Amateur Radio Organization in Alabama. "Buggy" was a houseguest of Foy, W4RLS, above left, shown with FARO President, Jug McCollum, center. *(Photo W4RLS)*

your contact with his DXpedition. . . . On the other hand, Jan, DL9KRA, has been receiving cards for 6W8DD incorrectly addressed to Box 19, Dakar, Senegal. Jan has no knowledge of this station and will return all cards received. . . . Juan, EA2CA, and Paula, EA2CQ, had quite a hectic time after their lovely daughter, Lourdis, was chosen "Miss Basque Country" in the preliminaries for the "Miss Universe" Beauty Contest. While Paula accompanied the young beauty to Palma de Majorca for the "Miss Spain" competition, Juan remained at home to complete Paula's log for the s.s.b. contest! No further word on Lourdis' success at this writing, but we'll keep you posted.

What a great pleasure it was to at last welcome Todor "Ted" Todoroff to sideband. He had been developing a station for the past year or more and finally showed up on sideband with a homebrew phasing type exciter driving a linear amplifier to about 600 w. p.e.p. with a W3DZZ beam and an HQ-110. His address is P.O Box 205, Sofia, Bulgaria and he is most anxious to give the W/K stations their first contact with LZ on sideband. . . . Gene, DL4FX, had some tentative plans to visit the Saar area in July as DL4FC/DL8, giving many a new prefix on s.s.b. . . . The new beam that Ben, UC2AA, is using has sure given him a superior signal. . . . Victor, HH2V, is the only station in Haiti to operate on 160 meters. . . .

While we find all our sideband contacts wonderful and exciting, we know you'll agree that there are some that are more memorable than others. Take a recent contact we had with Jim, GM3GUJ . . . it was 0027 GMT and the beam happened to be turned to Europe. A CQ was called and back came GM3GUJ with a 10 over 9 signal. Nothing unusual? Jim had been working on his exciter, lowering the power output in conformance with the rules of a forthcoming local contest, and we held the contact for almost one hour—Jim had an output of 15 watts!

Another delightful surprise contact was one with Noel, ZL2UW, who asked if we had ever contacted his XYL, Thelma, ZL2JO, and us not even knowing there was a ZL XYL on sideband! Conditions, unfortunately, were not ideal, but it was nice to have even a brief contact with Thelma and Noel.

Logs for the EA9AZ sideband activity are now with K1QAJ/6, 381 Cottonwood, Vacaville, California. . . Harry, EP2BQ, is a new sidebander in Iran. He is a geologist and has been licensed as ZL4JA and VS5JA. Congratulations to Marty, DL4FC, and XYL, Prudence who welcomed a beautiful baby girl, Barbara Jane, on May 30. . . . Ted, GI3CWY, who was one of the pioneer s.s.b. stations in Northern Ireland, turned up on 20 meters after a long absence to pass along the news that he and his XYL were off on a cruise to the Mediterranean during early Summer.

Another absentee from sideband, Mosh, 4X4FA, returned to explain that he had been QRT for almost a year, but was now active again with a modified receiver that should aid him in dispensing many more Israeli contacts. . . . That powerful signal from the station of Dennis, DL2AB, will continue for another year. Dennis had planned to return home, but his tour of duty in Germany was extended for another year. . . . Sid, PAØBSR, and his XYL plan to visit the States at the end of July. . . . Stan, KC6BK, ex-KR6IZ, is now on 14 mc s.s.b. in what is believed to be the first operation from Ponape Is. in the Eastern Carolines for s.s.b. He expects to be there for at least two years; his address is Kolonia, Ponape, E. Caroline Islands.

Mac, VK2ADC, was bedded with a mild coronary occlusion for several months during Spring but should be home by now continuing his convalescence; how about all his friends sending him get-well cards? . . . Forrest, EA8BA, is shutting down the station soon after July 1 and he and XYL, Bertha, will return to their home in Houston, Texas for a visit before spending a few months in the New Jersey area. . . . Les, ZS6PC, has high hopes of putting ZS9-land back on sideband now that his cohort, Peter, ZS6BBB, has added a KWM-1 to his shack. However, with conditions to Africa being so poor at the moment, they may wait until October before paying a number of weekend visits to Bechuanaland.

Band Hopping

Alice, K4TGA, had a most unique experience when she was invited aboard the U.S.S. *Cutlass* submarine, and permitted by Capt. Dan Reilly, W4NMK, to be the first XYL to operate the ham station when the vessel was submerged! Alice keeps regular skeds with the U.S.S. *Randolph* and the *Cutlass* on 40 meters and provides a pipeline into Norfolk, Virginia for many other Navy personnel on the other bands. Her note bubbled over with enthusiasm for our Navy men; knowing Alice, the admiration must be mutual. . . . Bob, K4PDV (VQ8BR) recently moved to a new home in Melbourne, Fla., surrounded by a full acre of land which he plans to use for antennas of all descriptions. . . . We were much taken with the QSL of Bob Chapman, W1QV, which is a legal-sized mimeograph sheet, including not only space for the necessary confirmation data, but also a most complete run-down on Bobs station and his personal background. For those of you who bemoan the expense of QSLs, the W1QV example is a most interesting substitute. . . . Congratulations to Shirley, W5DVV, and Jerry, W5CME, of New Orleans, La. who welcomed a new daughter, their fourth child in March. . . . Add El Salvador (YS) to your list as being OK for Third Party Traffic!

Kermit, W9YMZ, believes in action! He has sent all ARRL Directors and Vice-Directors the following request: "With s.s.b. now proven superior to a.m. or f.m. for amateur radio communication, may I suggest that the ARRL petition the FCC for a new Rule governing Amateur Service. The new Rule to read: 'Fifteen years after enactment, all amateur radiotelephone transmission below 25 mc shall be single side-

[*Continued on page 102*]

Phil Hudson, VS9APH, ex-GW3IEQ, is shown at his operating desk in Aden. Phil was one of the operators who made the DXpedition to the Kamaran Islands the outstanding success it was. Rumor has it that the same group is planning another DXpedition to still another rare spot in the Fall. *(Photo W3HQO)*

Space Communications

GEORGE JACOBS, W3ASK
11307 CLARA STREET,
SILVER SPRING, MARYLAND

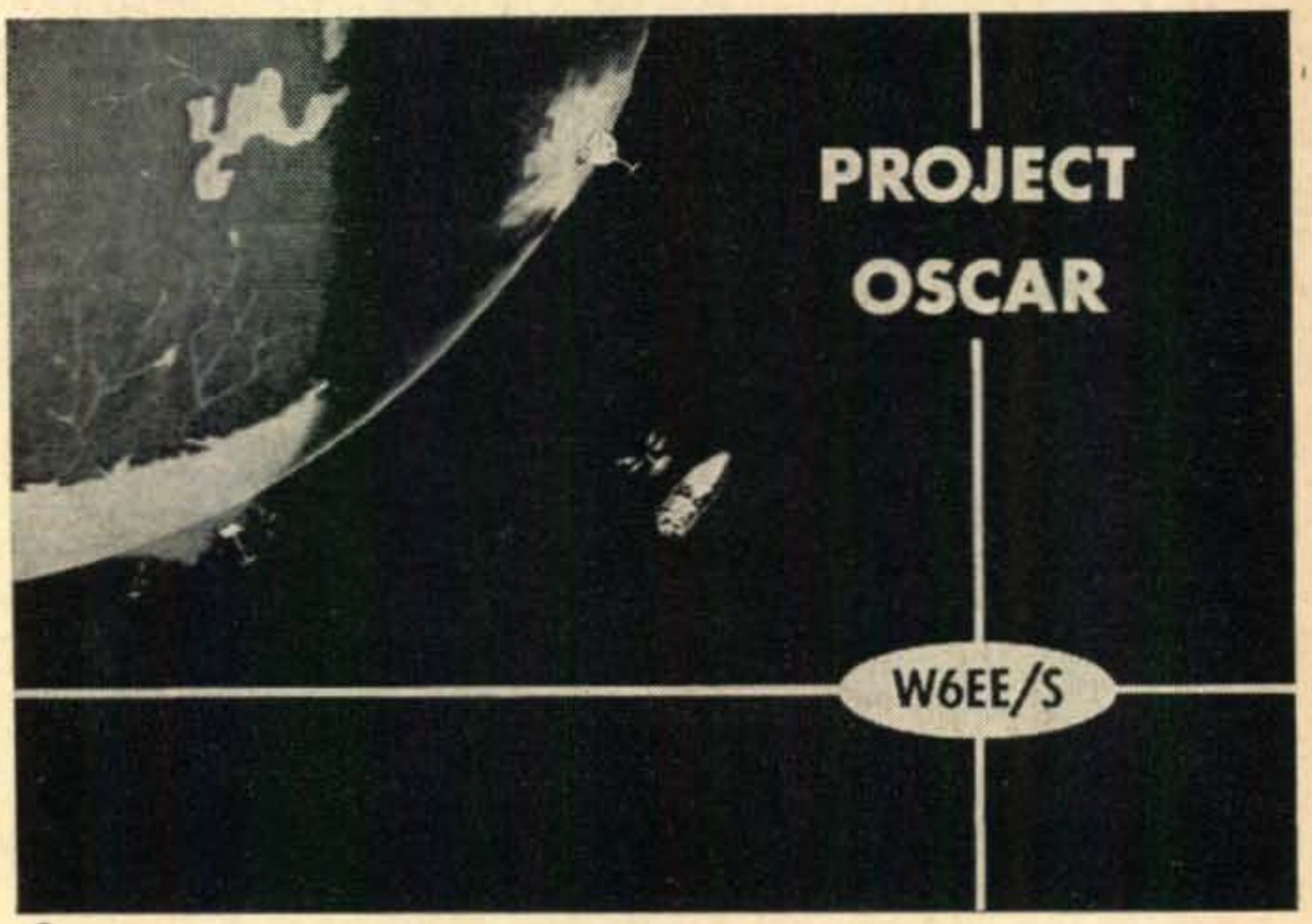
AT 0032 GMT, June 2, 1962, another important page was written in the history of amateur radio. At that moment, the second in a series of space satellites to be built entirely by radio amateurs streaked into space. The launching went off without incident, and the first amateur stations to report reception of OSCAR II's 100 milliwatt beacon transmitter was KL7FLB and KL7FLC, as the satellite roared over the arctic region on its initial polar orbit. OSCAR II's beacon transmitter, sending a continuous series of "HIs" in Morse in the internationally allocated 2 meter amateur band, was measured on a frequency of 144.992 mc during early orbits.

Preliminary reception reports and tracking data received from hundreds of radio amateurs and other observers during the first two weeks of June indicated that OSCAR II was launched in a southerly direction at an inclination of approximately 73 degrees with the equator. The initial period of the satellite was established as 91 minutes, but by mid-June it had dropped to 81 minutes, indicating a lower orbit than OSCAR I. OSCAR I, amateur radio's first satellite, was launched on December 12, 1961. It varied in altitude between approximately 150 and 270 miles above the earth's surface. Like OSCAR I, the newest satellite in the OSCAR series was launched into space as ballast on a booster rocket, at no cost to the American taypayer. OSCAR I remained on the air for three weeks, OSCAR II is expected to have a similar life period.

OSCAR II tracking and reception reports were pouring into Project OSCAR headquarters by mid-June. From early returns it appears that the participation of radio amateurs in the OSCAR II flight will far exceed the 500 who participated in the OSCAR I project. It also appears that the OSCAR II launch, and through it amateur radio, received considerably more publicity than OSCAR I, especially in the foreign press. Stories of OSCAR II's launch were carried by all major news services, and appeared in almost all major newspapers in the United States, Western Europe, and many other areas of the world. In Finland, for example, OH2TK, President of the Finnish Radio Amateur Society was asked to do a half-hour TV show on OSCAR II shortly after it was launched. In addition, the Finnish State Radio broadcast reports of OSCAR II's reception by various amateurs throughout the country. Although the primary purpose of the OSCAR program is to demonstrate that radio amateurs throughout the world can collectively contribute valuable technical services in the space age, the exceptionally good publicity the project is bringing amateur radio as a whole, is an important bonus.

As has been emphasized many times in this column before, getting an OSCAR satellite into orbit is only half the job. All the efforts of the OSCAR crew and the launching agency are wasted if *you,* as a radio amateur, do not participate in the project. *All* amateurs who heard OSCAR II are urged to send their QSL cards to the Project OSCAR Association, Box 183, Sunnyvale, California. The card should contain the time of reception, signal strength and duration, and if possible, the number of seconds taken for the satellite to send 10 HIs. Reports from s.w.l.s and other observers are also welcomed. See June's SPACE column for

[*Continued on page 102*]



Project OSCAR QSL card. Printed in blue, brown, grey and white against a black background, the above QSL card is being sent to everyone who reported reception of either OSCAR I or OSCAR II. Reception reports should be sent to the Project OSCAR Association, P.O. Box 183, Sunnyvale, California. Reports should contain the time that OSCAR was first heard, the time that the signal peaked, and the time that it faded out, and if possible, the number of seconds it took for OSCAR to send ten "HIs." The call letters W6EE were officially assigned to the OSCAR satellites by the FCC.

PROPAGATION

George Jacobs, W3ASK
11307 Clara St., Silver Spring, Md.

LAST MINUTE FORECAST

The following is a forecast of day-to-day propagation conditions expected during Aug. 1962. This forecast attempts to predict *specific* days upon which openings shown in the Propagation Charts in this column are most likely to occur, and the expected quality of the openings. For example, the following forecast shows that circuits rated (2) in the Charts are most likely to open with "good" quality (B) when conditions are above normal (August 1, 10-12, 15-16 and 28), and with "fair to poor" quality (C-D) on days when conditons are expected to be normal. Circuits rated (2) are not expected to open on those days forecast to be "disturbed," etc.

PROPAGATION CONDITIONS and CIRCUIT QUALITY

Prop. Chart Forecast Rating	*Above Normal Days* August 1, 10-12, 15-16, 28	*Normal Days* August 2, 6-9, 13-14, 17-19, 22-27, 29	*Below Normal* August 3, 20-21 30	*Disturbed Days* August4-5, 31
(1)	C	D-E	E	E
(2)	B	C-D	D	E
(3)	A	B-C	C-D	D-E
(4)	A	A-B	C	D

Where:

A—Excellent opening with strong steady signals.
B—Good opening, moderately strong signals, with some fading and noise.
C—Fair opening, signals fluctuating between moderately strong and weak, with moderate fading and noise.
D—Poor opening, signals generally weak, with considerable fading and high noise level.
E—Very poor opening, or none at all.

TYPICAL summertime shortwave radio propagation conditions are expected to continue through the month of August. Except for some occasional north-south openings, very little DX is forecast for 10 meters. DX openings to many areas of the world are predicted for 15 meters during the daylight hours, with conditions expected to peak during the afternoon period. Twenty meters is expected to be the optimum band for DX to all areas of the world during August. Peak conditions are forecast for the period a few hours after sunrise (local time in the USA), and during the late afternoon and early evening hours.

Despite seasonally high static levels, good DX propagation conditions are forecast for 40 meters during the hours of darkness, with some fairly good DX openings also predicted for 80 meters during the night hours. Because of high static levels, conditions on 160 meters are ex-

[*Continued on page 78*]

Forecast Ratings

The numerical ratings appearing in parenthesis following each predicted time of band opening indicate the *total* number of days during each month of the forecast period that the opening is expected to occur, as follows:

(1) Less than 7 days
(2) Between 8 and 13 days
(3) Between 14 and 22 days
(4) More than 22 days

For the *specific* days of each month on which a particular opening is most likely to occur, as well as a day-to-day forecast of reception conditions (signal quality, noise and fading levels), see the "Last Minute Forecast" which appears at the beginning of this column.

The *CQ* DX PROPAGATION Charts are based upon a c.w. effective radiated power of 150 watts at radiation angles lower than thirty degrees. The Eastern USA Chart can be used in the 1, 2, 3, 4 and 8 call districts; the Central USA Chart in the 5, 9 and ø districts, and the Western USA Chart in the 6 and 7 districts. The Charts are valid through Sept. 30, 1962. Propagation forecasts contained in these Charts are derived from basic ionospheric data published by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

August & September, 1962

EASTERN USA To:

TIME ZONE: EST (24-Hour Time)

	10/15 Meters*	*20 Meters*	*40 Meters*	*80/160† Meters*
Western & Central Europe	07-11 (1) 11-14 (2) 14-16 (1)	05-08 (2) 08-11 (1) 11-13 (2) 13-15 (3) 15-17 (4) 17-18 (2) 18-20 (1)	18-19 (1) 19-20 (2) 20-23 (3) 23-01 (2) 01-03 (1)	19-21 (1) 21-00 (2) 00-01 (1) 21-00 (1)†
Eastern Europe & European USSR	09-14 (1)	06-11 (1) 11-14 (2) 14-18 (1)	20-02 (1)	21-00 (1)
Southern Europe & North Africa	07-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	05-07 (2) 07-12 (1) 12-14 (2) 14-17 (4) 17-19 (2) 19-22 (1)	18-19 (1) 19-20 (2) 20-00 (3) 00-02 (2) 02-03 (1)	19-20 (1) 20-21 (2) 22-23 (3) 23-00 (2) 00-01 (1) 20-00 (1)†
South Africa	11-14 (1)* 06-10 (1) 10-12 (2) 12-14 (3) 14-16 (2) 16-18 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-22 (1) 05-07 (1)	18-19 (1) 19-21 (2) 21-23 (1)	19-21 (1)
Eastern Mediterranean	09-12 (1) 12-14 (2) 14-16 (1)	05-07 (1) 11-14 (1) 14-16 (2) 16-20 (1)	19-23 (1)	*Nil*

*Predicted 10 meter opening, all others 15 meters.
†Predicted 160 meter opening, all others 80 meters.

Central Asia	19-21 (1)	06-09 (1) 18-22 (1)	18-21 (1) 05-07 (1)	*Nil*
Southeast Asia	17-19 (1)	07-10 (1) 16-20 (1)	*Nil*	*Nil*
Far East	16-19 (1)	06-07 (1) 07-09 (2) 09-10 (1) 15-17 (1) 17-19 (2) 19-22 (1)	05-08 (1)	*Nil*
Samoa, Pacific Area & New Zealand	14-19 (1)* 08-10 (1) 13-17 (1) 17-19 (2) 19-21 (1)	18-20 (1) 20-23 (2) 23-07 (1) 07-09 (2) 09-12 (1)	23-02 (1) 02-05 (3) 05-07 (2) 07-08 (1)	03-07 (1) 04-06 (1)†
Australia	17-19 (1)* 08-10 (1) 15-17 (1) 17-19 (2) 19-22 (1)	06-07 (1) 07-09 (2) 09-12 (1) 17-21 (1) 21-23 (2) 23-01 (1)	02-04 (1) 04-06 (2) 06-08 (1)	04-06 (1) 04-06 (1)†
South America	09-13 (1)* 13-16 (2)* 16-18 (1)* 05-07 (1) 07-10 (2) 10-13 (1) 13-15 (2) 15-18 (4) 18-20 (2) 20-21 (1)	05-07 (3) 07-08 (2) 08-14 (1) 14-16 (2) 16-17 (3) 17-21 (4) 21-23 (3) 23-01 (2) 01-05 (1)	18-20 (1) 20-22 (2) 22-03 (3) 03-05 (2) 05-07 (1)	20-22 (1) 22-03 (2) 03-06 (1) 01-04 (1)†
McMurdo Sound, Antarctica	15-17 (1)* 13-16 (1) 16-18 (3) 18-19 (2) 19-21 (1)	14-16 (1) 16-19 (2) 19-21 (3) 21-22 (2) 22-00 (1) 07-09 (1)	00-05 (1)	*Nil*

Central USA To:

Time Zones: CST & MST (24-Hour Time)

	10/15 Meters*	*20 Meters*	*40 Meters*	*80/160† Meters*
Western & Central Europe	08-12 (1) 12-14 (2) 14-16 (1)	05-06 (1) 06-07 (2) 07-14 (1) 14-16 (2) 16-19 (1)	20-22 (1) 22-00 (2) 00-02 (1)	21-00 (1)
Eastern Europe & Eastern USSR	08-13 (1)	05-06 (1) 06-08 (2) 08-10 (1) 10-12 (2) 12-16 (1)	20-01 (1)	21-00 (1)
Southern Europe & North Africa	06-10 (1) 13-15 (1)	05-07 (2) 07-12 (1) 12-13 (2) 13-15 (3) 15-17 (2) 17-20 (1)	18-20 (1) 20-23 (3) 23-01 (1)	19-20 (1) 20-22 (2) 22-00 (1) 20-23 (1)†
Central Africa	07-10 (1) 10-13 (2) 13-15 (3) 15-17 (2) 17-19 (1)	05-07 (1) 12-14 (1) 14-16 (2) 16-18 (3) 18-20 (2) 20-22 (1)	18-20 (1) 20-21 (2) 21-22 (1)	20-22 (1)
Eastern Mediterranean	07-13 (1)	06-11 (1) 11-12 (2) 12-17 (1)	19-22 (1)	20-22 (1)
Central Asia	07-12 (1) 18-21 (1)	06-07 (1) 07-09 (2) 09-10 (1) 18-21 (1)	19-21 (1) 05-07 (1)	*Nil*
Southeast Asia	10-13 (1) 18-21 (1)	07-09 (2) 09-12 (1) 20-00 (1)	05-07 (1)	*Nil*
Far East	07-10 (1) 14-16 (1) 16-19 (2) 19-21 (1)	06-07 (1) 07-09 (2) 09-13 (1) 20-23 (1)	05-08 (1)	*Nil*
Samoa, Pacific Area & New Zealand	13-20 (1)* 11-12 (1) 12-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-04 (2) 04-07 (1) 07-09 (3) 09-11 (2) 11-13 (1)	23-01 (1) 01-06 (3) 06-07 (2) 07-08 (1)	01-03 (1) 03-06 (2) 06-07 (1) 03-07 (1)†
Australia	15-19 (1)* 08-10 (1) 13-16 (1) 16-20 (2) 20-21 (1)	20-22 (1) 22-00 (2) 00-07 (1) 07-09 (3) 09-10 (2) 10-11 (1)	03-04 (1) 04-06 (2) 06-08 (1)	04-05 (1) 05-06 (2) 06-07 (1) 04-07 (1)†
Northern & Central South America	08-16 (1)* 06-08 (1) 08-12 (2) 12-15 (3) 15-17 (4) 17-19 (2) 19-21 (1)	02-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-19 (4) 19-23 (3) 23-02 (2)	19-21 (1) 21-22 (2) 22-01 (3) 01-03 (2) 03-06 (1)	21-23 (1) 23-02 (2) 02-05 (1) 23-03 (1)†
Argentina, Chile & Uruguay	09-13 (1)* 13-16 (2)* 16-18 (1)* 06-08 (1) 08-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-20 (2) 20-21 (1)	14-16 (1) 16-18 (2) 18-20 (4) 20-01 (3) 01-03 (2) 03-05 (1) 05-07 (2) 07-09 (1)	20-22 (1) 22-02 (2) 02-04 (1)	23-03 (1) 23-03 (1)†
McMurdo Sound, Antarctica	14-18 (1)* 11-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	16-18 (1) 18-20 (2) 20-21 (3) 21-23 (2) 23-00 (1) 08-11 (1)	23-06 (1)	*Nil*

Western USA To:

Time Zone: PST (24-Hour Time)

	10/15 Meters*	*20 Meters*	*40 Meters*	*80/160† Meters*
Western & Central Europe	06-08 (1) 10-13 (1)	05-06 (1) 06-08 (2) 08-11 (1) 11-14 (2) 14-17 (1)	19-01 (1)	21-00 (1)
Eastern Europe & European USSR	06-09 (1)	05-06 (1) 06-09 (2) 09-16 (1)	19-00 (1)	*Nil*
Southern Europe & North Africa	06-10 (1) 10-12 (2) 12-14 (1)	05-06 (1) 06-08 (2) 08-12 (1) 12-14 (2) 14-18 (1)	18-19 (1) 19-21 (2) 21-22 (1)	19-22 (1)
South Africa	06-10 (1) 10-13 (2) 13-15 (1)	04-06 (1) 11-13 (1) 13-16 (2) 16-18 (1)	18-19 (1) 19-20 (2) 20-21 (1)	19-21 (1)
Eastern Mediterranean	08-11 (1)	06-12 (1) 19-21 (1)	*Nil*	*Nil*
Central Asia	16-19 (1)	06-07 (1) 07-09 (2) 09-12 (1) 15-16 (1) 16-18 (2) 18-22 (1)	05-07 (1)	*Nil*
Southeast Asia	08-09 (1) 09-11 (2) 11-15 (1) 15-18 (2) 18-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-00 (1)	03-07 (1)	03-06 (1)
Far East	12-14 (1) 14-18 (2) 18-20 (1)	06-07 (1) 07-10 (2) 10-19 (1) 19-22 (2) 22-00 (1)	00-02 (1) 02-06 (2) 06-08 (1)	03-07 (1) 04-06 (1)†

[*Continued on page 102*]

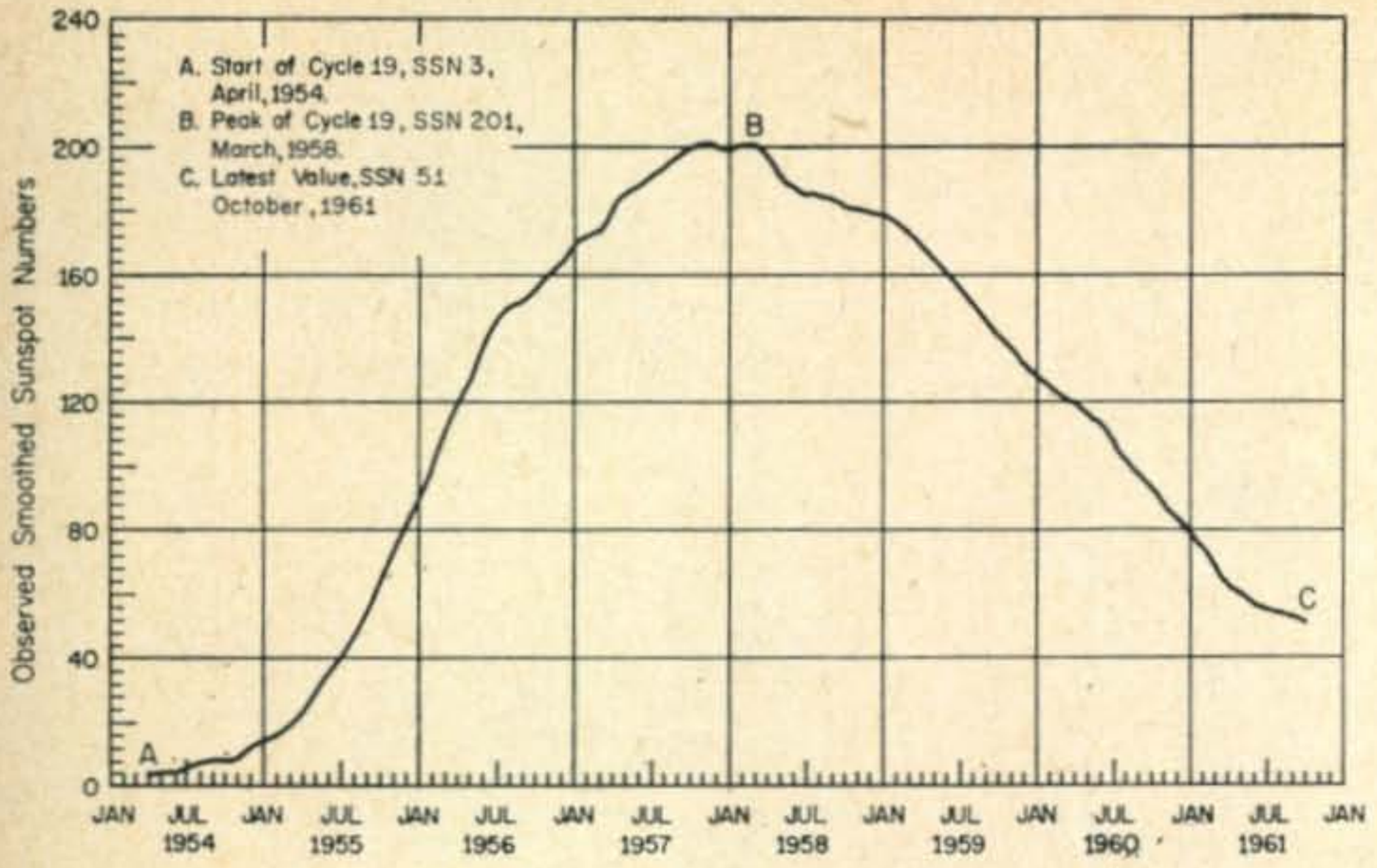


Fig. 1—Graph illustrating the progress of Sunspot Cycle 19 from April 1954 to Oct. 1961.

pected to be noisy, but some DX openings may be possible during the hours of darkness.

This month's DX PROPAGATION Charts are presented in a new, clearer and easier to read form than previously. Times of band openings appearing in the Charts are given in the 24-hour time system. In this system 00 is midnight, 01 is 1 A.M., 02 is 2 A.M., etc., until 11 for 11 A.M. The figure 12 is used for noon, 13 for 1 P.M., 14 for 2 P.M., etc. The 24-hour time system can be converted to equivalent P.M. times simply by subtracting 12 from any number greater than 12 in the 24-hour system. For example, if an opening is shown in the Charts for 14-20, this means 2 P.M. to 8 P.M., Local Standard Time.

VHF Ionospheric Openings

One of the year's most prolonged and intensive meteor showers, the *Perseids,* is expected to take place during August. During the Perseids shower, which begins during late July and reaches a peak in mid-August, more than 100 million meteors are expected to enter the earth's atmosphere each day. While most of these are no bigger than a grain of sand, many will be large enough to leave a characteristic trail, and will be visible from the earth as "shooting stars." The ionization produced by the Perseids meteor shower is expected to result in numerous opportunities for meteor scatter openings on both 6 and 2 meters, especially during mid-August.

Some 6 meter short-skip openings between distance of approximately 900 and 1300 miles are expected during August as a result of sporadic-*E* propagation. There is also a possibility that an occasional sporadic-*E* opening of approximately 1200 miles may occur on 2 meters.

During periods of ionospheric disturbances it is often possible to reflect 6 and 2 meter signals from the ionosphere for distances ranging upwards to approximately 1000 miles. These reflections take place from intense ionization usually associated with auroral displays. Check the "Last Minute Forecast" appearing at the beginning of this column for periods that are expected to be disturbed during August.

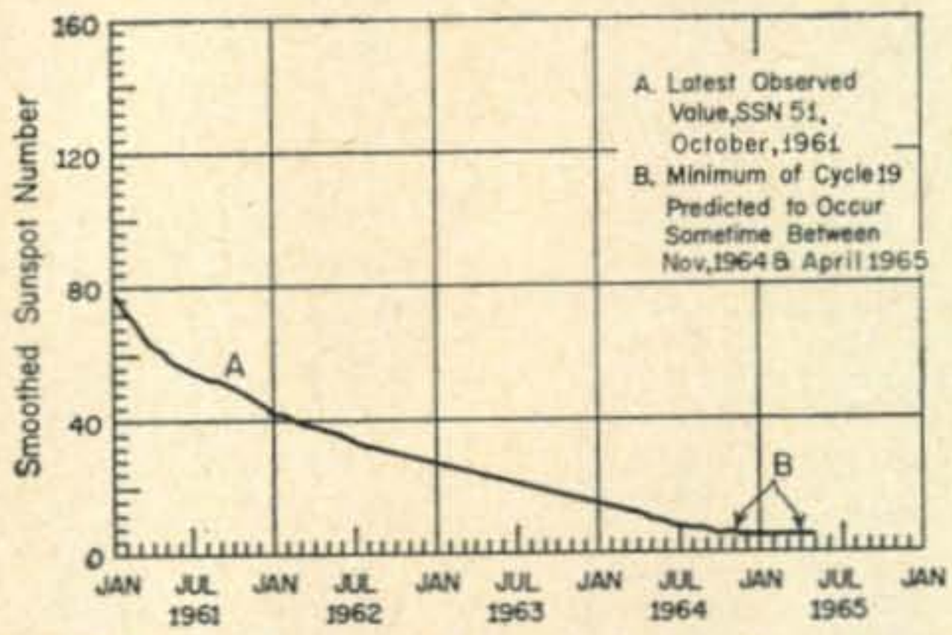


Fig. 2—Predicted smoothed sunspot numbers for the remainder of Sunspot Cycle 19 from October 1961 to May 1965. The actual sunspot minimum is expected to occur at B.

Sunspot Cycle Progress

The progress of sunspot cycle 19, from its beginning in April 1954 to the latest available smoothed sunspot number (October 1961), is shown in tabular from in Table 1, and graphically in fig. 1. The present cycle, which reached an unprecedented peak of 201 during March 1958, has now declined to a smoothed sunspot number of 51. The cycle is expected to continue to decline slowly, but steadily, until a minimum is reached, probably sometime between November 1964 and April 1965 (see fig. 2 and italic figures in Table 1). A smoothed sunspot number of 32 is predicted for August, 1962.

73, George, W3ASK

TABLE 1

Values of smoothed sunspot numbers observed during Cycle 19 and predicted for the remainder of the decline. Italic figures indicate future estimated sunspot numbers.

Year Month	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Jan	....	14	89	170	199	179	129	80	*43*	*27*	*14*	*5**
Feb	....	16	98	172	201	177	125	75	*42*	*26*	*13*	*5**
Mar	....	19	109	174	201	174	122	69	*40*	*25*	*12*	*5**
Apr	3	23	119	181	197	169	120	64	*38*	*24*	*11*	*5**
May	4	29	127	186	191	165	117	60	*37*	*23*	*9*	....
Jun	4	35	137	188	187	161	114	56	*36*	*22*	*8*	....
Jul	5	40	146	191	185	156	109	52	*34*	*21*	*7*	....
Aug	7	46	150	194	185	151	102	52	*32*	*20*	*7*	....
Sep	8	55	151	197	184	146	98	52	*31*	*19*	*6*	....
Oct	8	64	156	200	182	141	93	51	*30*	*18*	*6*	....
Nov	9	73	160	201	181	137	88	*48*	*29*	*17*	*5**	....
Dec	12	81	164	200	180	132	84	*46*	*28*	*16*	*5**	....

*Actual minimum is presently expected to occur sometime between Nov., 1964 and Apr. 1965.

VHF

50mc. 144mc. 220mc. 420mc. and above

DONALD L. STONER, W6TNS
ALTA LOMA, CALIFORNIA

HECTIC is the only word descriptive of the last 30 days. With only a short time to recover from the Dayton "bash," I hopped on a United Mainliner for Fresno to attend their annual convention. My host was the gracious Floyd Drenon, W6FXV. Although not as big as Dayton, everyone had a fine time and it provided an opportunity to meet many of the mid-state v.h.f. operators. Once the Fresno convention was history, it was back to the office just long enough to get some work done before the swinging Disneyland affair.

I have attended big ones before, but "dizzyland" was by far the biggest—Swampscott included! Guesses as to attendance ranged from 8,000 to more than 12,000. The League officials were surprised to learn that the automobile had almost entirely replaced the covered wagon in California and that there were no hostile Indians to be found anywhere.

The OSCAR II shot signaled the opening of the convention by being injected into orbit at 5:35 PDT. A tracking station set up by the Microwave Society of Long Beach disseminated information and copied many of the passes.

The v.h.f. session included a conference call to the OSCAR headquarters in Sunnyvale and was set up so that the audience could listen in on the Association Chairman, Mr. Chuck Towns, K6LFH.

The highlight of the convention for me was the v.h.f. breakfast on Sunday morning. About 40 attended including John Chambers, W6NLZ, Mr. 6 meter forward scatter, Allan, W6FZA, and W7LEE, Turk, of Parker, who provided many Californians with their first Arizona contact. Most interesting to me were tapes played by Bill Conkel, W6DNG. Without any horn tooting, Bill was obtaining moon echos back in 1957 on the two meter band. More recently Bill has been receiving meteor scatter c.w. signals from the east coast on two meters. His tapes included several excellent c.w. bursts that even I could copy! So much for Disneyland; next year we invade San Diego.

Yours truly explaining the mysteries of the McCoy sideband filter to Floyd Drenon, W6FXV.

VHF Around the World

George, G2DHV, Sidcup, Kent, England reports two openings of medium skip, but though he was midway between two DX stations heard, he could not work either! George is using the same equipment as last year when DL1ON/PA was worked. On this occasion no contacts made although ON and PA stations were heard. He called one ON station (an old friend) for five hours without result. Since then he is using a 6 over 6 slot with 40 watts from a QQVO3/20A power amplifier.

I have been sitting on this one for a long time but "now the story can be told" as the newspapers like to say. Bob Hunsucker, KL7-CYS, who works for the Geophysical Institute at the University of Alaska (Box 938, College, Alaska) is about ready to go with a fabulous moonbounce setup. His group expects to be operational by the middle of July. The receiving setup includes a Nuvistor converter feeding an R-390 receiver. Bob is almost certain that they will be able to use the 61 foot parabolic dish there for the antenna if they can get the bugs worked out of the tracking system. Because of the lead time for this column, it is suggested that you drop them a line for skeds and frequencies.

The High Nets

The East Coast V.H.F. Single Sideband Assoc. will be holding their "on the air" meetings at 11:00 A.M., EDST on Sunday mornings during the summer months, according to Vito Bono, K2PXP, 59 Van Houten Ave., Passaic, New Jersey.

The Happy Gang, a 25 station net operating nightly on 146.17, has honored their late VP, silent key K2OKX, by securing his station call for use by the club. Ed Mannheimer was well-known to many two meter operators.

Let's Get Technical

Several months ago I discussed parametric frequency multipliers for v.h.f. which brought

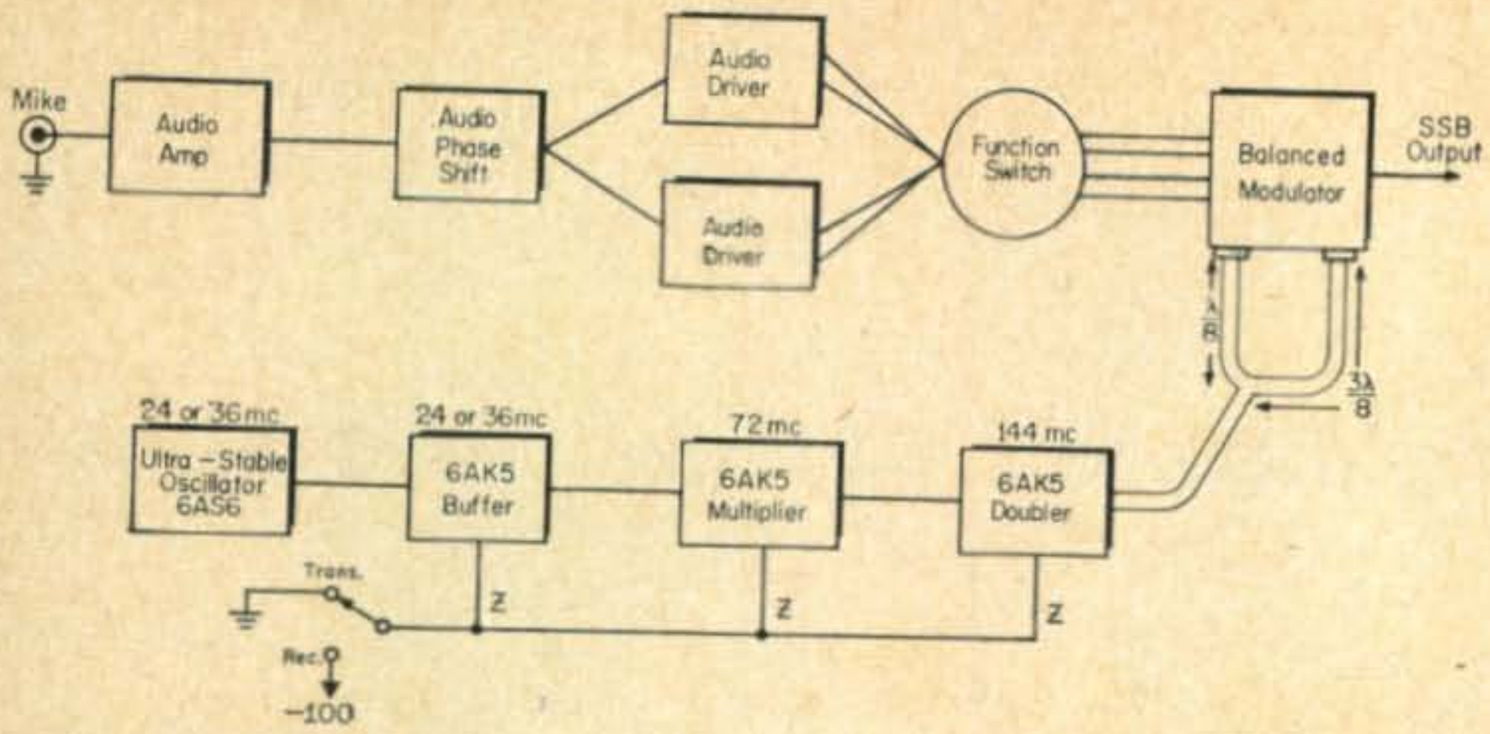


Fig. 1—Block diagram of the W2WZR direct sideband phasing rig for the two meter band.

a lot of correspondence. I should have a parametric multiplier construction project ready for the column shortly. Finding the lowest cost diode which will do the job is somewhat of a problem. In the mean time, you might do what I did and request a copy of "A Practical Approach to the Design of Parametric Frequency Multipliers" by George Luettgenau and J. Williams of Pacific Semiconductors and H. Miyahira of Space Technology Laboratories. The 16 page paper includes an analysis of the problem, general design procedures and experimental results. Illustrations, circuit diagrams and component values are included. Single copies may be obtained from Mr. Frank O'Brien, W6IAL, TRW Electronics, 12955 Chadron Avenue, Hawthorne, California.

Low Noise Tubes

The March 1961 issue of the R.S.G.B. *Bulletin* contained an interesting article by Jessop, G6JP, on noise factor of several v.h.f. tubes. Figures and curves are given for the 417A and 6CW4 among others. However, the amazing point brought out is that the English A-2521 and A-2599 are significantly better than either of these two American tubes. Author Jessop lists the USA equivalents of the English tubes as the 6CR4 and 6CT4 respectively. Both tubes are claimed to be 1.1 db better than the 417A at 145 mc! Has anyone worked with these jugs who can verify the findings and, more important, know where they are available.

VHF Sideband

Being an ole sidebandit, it is only logical that I migrate in that direction on the v.h.f. bands. P & H Electronics have kindly loaned me a 6 meter transmitting converter which I am putting through its paces and will report on later. Also next month, a special surprise is in store for those jokers who say sideband exciters are too expensive. It's a two-tube (yes—two) s.s.b. exciter for 14 mc and can be used in conjunction with any low-level converter circuit.

Amazing things are being done on v.h.f. sideband. For example, Jim O'Hern, W2WZR, has developed a direct sideband phasing rig for two meters. A block diagram of the ingenious system is shown hereabouts (fig. 1). In correspondence with Jim, I learned that the construction details are due to appear in General Electric's *Ham News* sometime this year. The r.f. phase-shift is conveniently obtained by using ⅛ and ⅜" wave lines into the balanced modulator circuit. The unit has been built by several hams and all report excellent results. Canadian VE3BOB constructed one for VE2TT and Ray is "tickled pink" with its performance. He is currently driving a pair of 4X250B's by amplifying the basic generator output with a 6360. With the balanced modulator alone, he was able to work several miles. Jim has worked VE3BPR (about 90 miles) using the barefoot exciter. Jim says that a 600 kc change in frequency requires no retuning—just plug in a new crystal. Further, he advises me that VE3BPR, VE2TT, VE3BOB, K2APS, K2POZ, K2LMG, K2GGA, WA2GJA, W2CTJ, W2TVO and W2WZR are all on two meter sideband in the Syracuse area and others are "a-buildin." For you die-hards, I quote Jim: "On tests with K2LMG, s.s.b. has shown to be equal and sometimes better than c.w. It gets better than c.w. on a weak signal tropo multipath, when

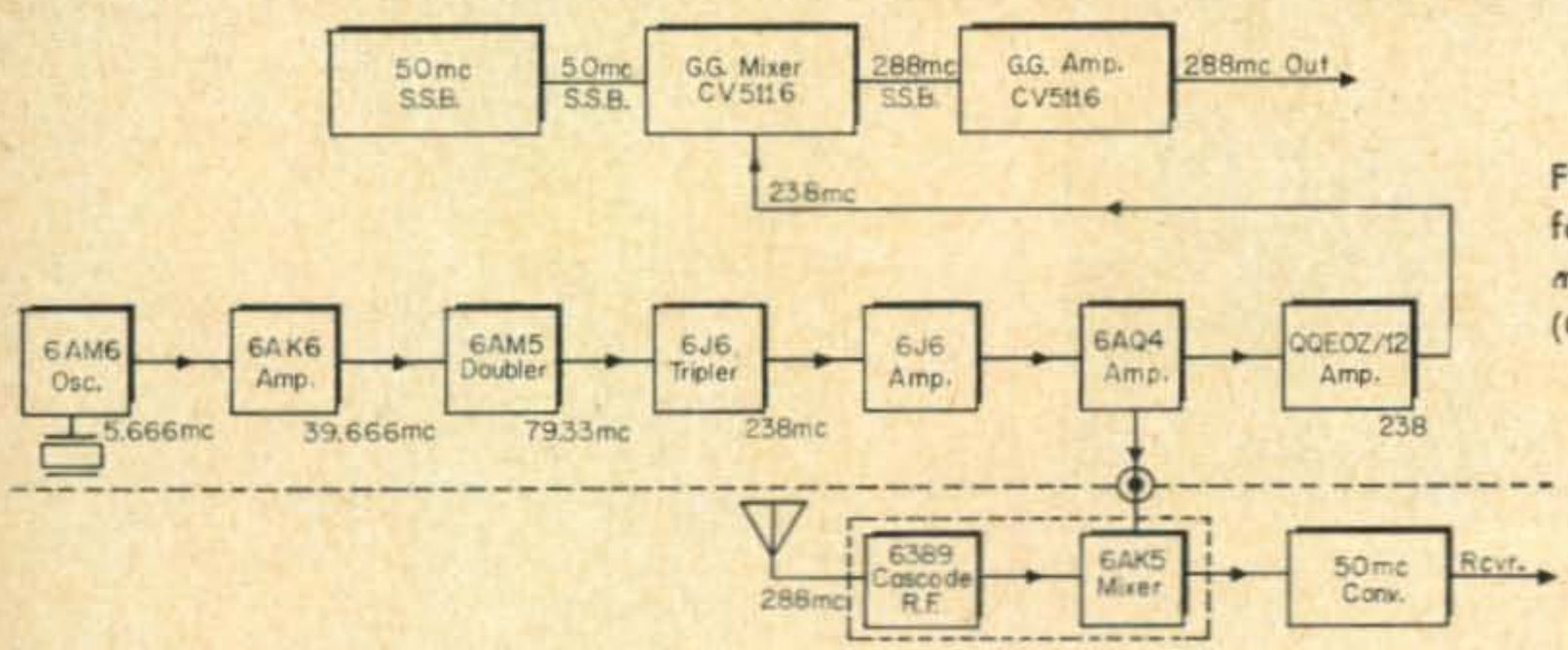


Fig. 2—Block diagram for the VK3EHL 288 mc sideband station. (Courtesy of *Amateur Radio*, Aust.)

c.w. tends to run together with the noise."

Think you are an individualist when you get on two s.s.b.? Quite a few stations have already been on 1296 s.s.b. and are having regular contacts. How about Lance, VK3AHL, who has the distinction of probably being the only ham in the world on 288 mc s.s.b.? A block diagram of Lance's rig is shown in fig. 2. A 50 mc sideband generator is used to drive the CV5116 mixer and beats with the 238 mc heterodyne source. The 288 mc resultant is amplified by a grounded grid stage and fed to the antenna for radiation on the third Australian v.h.f. band. The output has the same stability as Lance's broadcast band Franklin v.f.o. used in his 50 mc gear. The 238 mc local oscillator is also injected into the receiving converter which drives the 50 mc converter and the variable i.f. receiver.

VHF'er of the Month

Most of the v.h.f.'ers mentioned in this spot are heard about through the mails. This month it is a pleasure to say I know this one personally. Notice that it is not a "man of the month." Our nomination is Mrs. Kay Brandenberg, K8IYW, who won the VHF'er of the Year award at the Dayton Hamvention. Kay not only is a member of MARS, YLRL, Buckeye Belles and ARRL but started the Miami Valley V.H.F. net and has been net control for four years! She is also a member of RACES and the Miami Valley CD Authority. She has been on the air during each weather warning, operating both 2 and 6 meters by herself. One time during a warning she was in the middle of washing clothes and was only able to finish some 9 hours later. On another occasion she operated from 1 to 6 A.M. Kay was the first XYL in the country to be a member of the *CQ* Century Club on 50 mc and receive a plaque for it. Another first included making early recordings of Sputnik which were used on local radio and television stations. Kay has been the editor of the local club newspaper *RF Carriers* for two years in addition to heading the Ladies activities at Dayton. I could go on, if space permitted, but suffice to say Kay is an outstanding ham and ardent v.h.f.'er who we could all take a lesson from. I'm proud to know her as are all her friends!

Mrs. Kay Brandenberg, K8IYW, our VHF'er of the Month. (Photo by Lane Jackson, KØKJX.)

Who's News?

From down Carolina way, via the *Ragchewer,* W4ULE reports that band conditions are getting better on 6. More locals are showing up looking for openings and discover they are not alone. WA4AET, Case, says several openings have occurred recently and reveal tremendous s.s.b. activity on 6 across the country. Also Earl, W4SOP, has put s.s.b. on 6 at Burlington, N. C. WA4ACN, Paddy, is also going the 6 meter s.s.b. route. W4OAB, Brian, reports sporadic *E* openings now occurring on 6 with Fla., Texas, Nebr., Mich., etc. being worked in addition to Cuba. Swinging up to two meters, we find W4PLL, Doyle rumored to be working out moon bounce skeds with ZS61E.

W1BU and KH6UK are currently running moonbounce skeds on 1296 mc. Signals have been heard one-way already with two-ways expected momentarily. Another rumor has it that the sked frequency for the moonbounce crew is 7095 kc nightly 2300 to 2400 EST and is populated by W1BU, W2CXY, W8KAY, W6AJF, W6NLZ, and KH6UK.

John P. White, Jr., W5UKQ, 363 South Adadian, Baton Rouge, Louisiana, is cranking out with a sideband kilowatt on 144.110 and inhaling with a Tapetone Converter driving a 75S-3 all wired up to an 11 over 11 perched about 50 ft. up. The exciter is homebrewed up from various circuits. John is going the APX-6 route and would like to put his meat hooks on some coax connectors and relays for use with the APX-6. He suggests we keep an ear open for the area big guns who include W5GIX, Stan, W5BAU, Paul in New Orleans, K5ZQX, Don on s.s.b. in Pt. Allen, K5GEV, Ferd in Sunset, W5FYZ, Ernie in Minden and a raft of smaller rigs. Texas is also good for s.s.b. on two with Dallas and Houston worked.

KL7AUG, of Ketchikan, Alaska, has been heard on 20 discussing a six meter powerhouse being readied for c.w. scatter operation. Also KL7AUV of Anchorage, is trying to make the grade into the Seattle area on 6 about 11:30 P.M.

Six meters is really swinging in Southern California. Unfortunately W6TNS is, at this writing (early June) a just passive listener, a fact which galls me no end. About two weeks ago we had a beaut! About 8 P.M. the idiot box was acting up on channel 2 from co-channel interference. Ordinarily this would not be unusual except that my QTH is 30 miles line-of-sight from the many kilowatt stations and the

[*Continued on page 104*]

Novice

BY WALTER G. BURDINE, W8ZCV
R.F.D. 3, WAYNESVILLE, OHIO

I AM amazed to find that a large percentage of the world's population knows nothing about the ham and his hobby. Few people know of the large numbers of well trained radio operators of which our hobby is composed or that these radio operators form a vast communications network in the event of an emergency. This emergency need not be a war, but an ice storm, a large fire, snow, a flood or even a large accident. Amateurs are always ready to furnish communications or to aid local Red Cross or law enforcement officers. Amateurs have been called upon to furnish communications for almost every kind of service that you can imagine, and have usually come through. I, myself have helped furnish communications for scrap-paper drives, National Glider meets at Vandalia, Ohio, torchlight parades and boat races along with many other projects.

A number of people have written asking for information on just how to go about acquiring an amateur license. How much do they cost? . . . Where do you apply? . . . What is required to become licensed? . . . and so on. I will try to answer some of these questions in this month's NOVICE.

Science Fairs

Something that pleases me is the fact that many schools are now participating in the Science Fair Program. Many of our young folks are taking this way to start a possible career for themselves. They are learning science the easy way through their projects. In addition, those *attending* the exhibits are also learning.

Many letters tell of the writer's first contact with amateur radio at a Science Fair and then later becoming a ham. I approve of this way if selling science training and ham radio and have been helping a number of young folks with ideas for their projects. I don't think its right for parents to help their budding scientists by doing the work for them and letting him take the credit. Many of those participating in science projects become very proficient in their projects. You would enjoy, and be surprised by these teen-age doings. Why not attend the next Science Fair in your locality. The teenagers need your support and I'm sure you'll enjoy it.

Net Information

If you have a net going in your community, put the information in a letter to me and I will be glad to print it in the column for all to read.

Bill Holland, WN4EUL, 1412 Mediterranean Avenue, Virginia Beach, Virginia sends this information:

Bill says, "Here in Virginia we have just started a net. The net meets every Sunday morning at 0800 EST. We operate on two frequencies: 3728 and 3747. I am net control and will be on 3728 and Angelo, WN4ENX, the assistant net control will be on 3747 helping to keep the main frequency clear of some of the QRM. Presently the net has about ten members on the roll. The net is called by the signal "QVN." Following roll call, out of state hams may check in."

Thanks, Bill, and I hope a lot of Novices call into your net and get enough practice to get their General class licenses. Handling traffic and net operation is an excellent way to improve your code speed. Having a purpose in using the code makes it much more interesting.

Getting the Amateur License

Too many people approach amateur radio with a "down-beat" attitude. They just *know* they can't learn the code! All those dits and dahs sound alike and those chicken tracks (diagrams) mean absolutely nothing to them. This attitude keeps many from enjoying the fruits of amateur radio. But even the physically handicapped are able to pass the test a large portion of the time! Amateur radio is one of the best suited hobbies for a person that is unable to get about. It opens up a whole new world to the handicapped and there are many of them on the air. Make up your mind that you can do it and you will be able to; you are then well on your way to becoming a ham.

Just what is an amateur? What does he (or she) do? How much does the license cost? Why are *they* issued licenses when other services are in need of the wavelengths? Can anybody get a license? What is the difference between portable and mobile operation? What do you do when you move? How much do I need to know to get a license? These questions and many more have been asked of me many times. I subscribe to the Federal Communications Com-

mission's Rules and Regulations Volume VI containing parts 12, Amateur Radio Service, 19, Citizens Radio Service and 20, Disaster Communications Service. The cost is only one dollar and twenty-five cents from The Superintendant of Documents, Government Printing Office, Washington, D.C. This is money well spent if you are contemplating entering the ranks of amateur radio.

I think the best way to answer some of these questions is to quote directly from the Rules and Regulations:

SUBPART A—AMATEUR RADIO STATIONS AND OPERATORS

§ 12.0 *Basis and purpose.* The rules and regulations in this part are designed to provide an amateur radio service having a fundamental purpose as expressed in the following principles:

(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary non-commercial communication service, particularly with respect to providing emergency communications.

(b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.

(c) Encouragement and improvement of the amateur radio service through rules which provide for advancing skills in both the communication and technical phases of the art.

(d) Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.

(e) Continuation and extension of the amateur's unique ability to enhance international good will.

DEFINITIONS

§ 12.1 *Amateur service.* The term "amateur service" means a radio service carried on by amateur stations.

§ 12.2 *Amateur operator.* The term "amateur operator" means a person interested in radio technique soely with a personal aim and without pecuniary interest, holding a valid license issued by the Federal Communications Commission authorizing him to operate licensed amateur stations.

§ 12.3 *Amateur station.* The term "amateur station" means a station used by an amateur operator, and it embraces all radio transmitting apparatus at a particular location used for amateur service and operated under a single instrument of authorization.

§ 12.4 *Amateur portable station.* The term "amateur portable station" means an amateur station that is so constructed that it may conveniently be moved about from place to place for communication, but which is not operated while in motion.

§ 12.5 *Amateur mobile station.* The term "amateur mobile station" means an amateur station that is so constructed that it may conveniently be transferred to or from a mobile unit or from one such unit to another, and is ordinarily used while such mobile unit is in motion.

§12.6 *Amateur radio communication.* The term "amateur rado communication" means radio communication between amateur stations solely with a personal aim and without pecuniary interest.

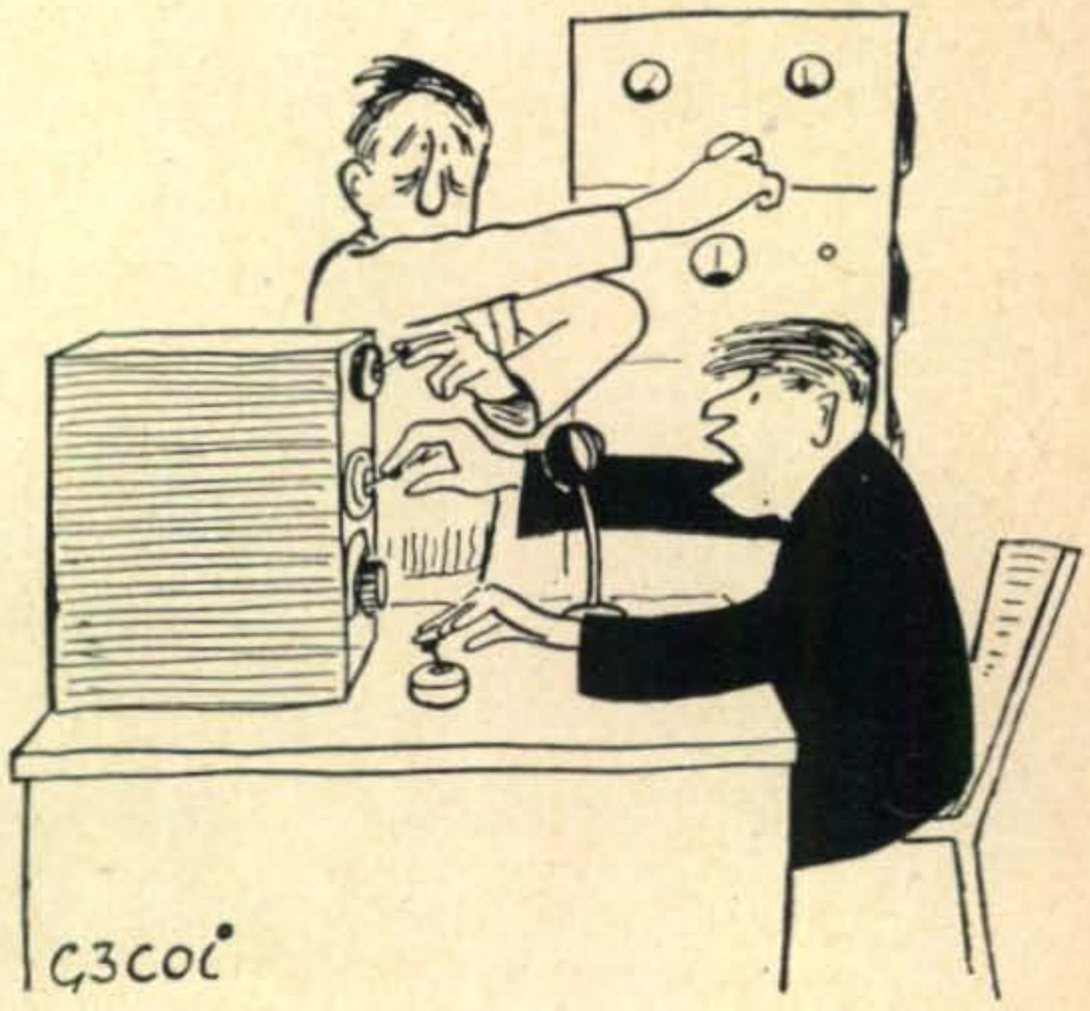
There are your definitions pertaining to the amateur service; they are brief and to the point. They *may* be asked on your examination.

Amateur licenses are issued only to citizens of the United States and the licenses are not sold but are given to the individual after he has taken an examination covering radio operation and theory. The test covers a code copying effort, five words per minute for the Novice and Technician licenses and thirteen words for the General and Conditional licenses. The Extra class requires a code speed of twenty words per minute. Code must be copied for a period of at least one minute at the speed specified for the grade of license application. The test for Novice and Technician licenses is taken in three phases: code receiving test, code sending test and a written test covering regulations, theory and operation of the station equipment.

The first thing to do when you decide that you want to be a ham is to learn the International Morse Code so that you can receive and send at least five 5-letter words per minute. This will take some practice and a good deal of hard work, but isn't as hard as you may think. While you are learning to handle the code proficiently you should also learn enough theory to pass the test. Almost all radio stores have a good license guide to help you; the CQ *License Guide* would be very helpful. They are not costly considering the help they give. Ask the clerk at your local radio supply store to help you with your student supplies. The YMCA in most cities, the local radio clubs and many hams give a course in amateur radio that will help you qualify for the license. This should take two or three months of your time. Don't give up!

After you are ready to take the test you should write to the radio inspector in your district for application form 610 and the examination Novice or Technician license. *Do not open the license examination envelope.* The questions should be opened by the person that gives you the examination and handed to you. The form 610 should be given to the examiner after it has been properly filled out and notarized, he will then give the code test and if you pass that, he will give the written examination. After finishing the examination the completed exam should be placed in an envelope addressed to the Field-Engineer-In-Charge of your district. I always place my name in the return address space in case the exam should be returned for any reason. The cost of notarizing the form 610 is the only cost of the license.

The examinations for Novice and Technician class licenses may be supervised by not more than two volunteer examiners, whom the commission may designate or permit the applicant to select. Not more than one examiner is permitted for the code test and not more than one for the written



"Yes, we've been using full break-in for years . . ."

Whatcha got? A rare one? The operator is 12 years old Ann Partridge, WL7DYN, Fort Greely, Alaska. Her DX-60—RME 4350 combo should pull in the DX. Good luck, Ann.

test. Both tests can be given by the same person if you desire. In the event the examiner for the code test is selected by the applicant, the examiner must be the holder of an Extra class, Advanced class, or General class amateur operator license, or have held, within the last five years, a commercial radiotelegraph operator license issued by the FCC or have been employed as an operator of a radiotelegraph station in the service. The examiner must be at least 21 years of age for the written test. A local General class amateur can give you both parts of the examination if he is 21 years old.

Contacting A Local Amateur

I have received a number of letters asking how to contact a local amateur. Ask at the post office, the local radio repair shop or the local broadcast station. If that fails to unearth an examiner, write me and I will put your name in our Help-Wanted section. This should get *someone* to help you. Incidentally, a grade of at least 74 percent is required for passing.

In countries other than the United States, the required information may be obtained from the Post Office, a local broadcast station or possibly from the police department. Each country has rules and regulations of their own making. All radio amateur operation is controlled by both the Internation Telecommunications Union and the national governments. The foregoing information should give you enough hints to find the balance of the information you will require.

Letters

Again this month, ladies first. We received a nice picture and letter from Ann Partridge, WL7DYB way up at Fort Greely, Alaska and from what Ann tells us there are several reasons she should be a success in her new found hobby. First off, she's on the Honor Roll at school and to prove she belongs there, she won her school's Fire Prevention Essay Competition to boot. Twelve year old Ann says she would like to sked other YL's and can be reached at Box 212, Hq. Company, APO 733, Seattle, Washington.

Ann uses a DX-60 for transmitting and an RME 4350 for receiving with a 40 meter long wire and 15 meter dipole handling the antenna situation. Looks like a real fine business setup to me. Alaska isn't exactly the easiest state to work so she shouldn't have any trouble getting contacts. I know I'll be listening; how about you?

Woodie, WN5AWS, Box 155, Verona, Mississippi sends along this nice letter. He's the first Mississippi ham to drop me a line.

"Dear Walt, I have started reading the NOVICE section of *CQ* lately and have found it most helpful in my hamming. Your item on power supplies a few months ago was very helpful to me as I built my first power supply.

"The rest of my rig is a homebrew 25 watter and my brother's (W5EPN) Mohawk. I hope to have some sort of a homebrew receiver to top off my homebrew rig.

"In your first column you said that you would like to know what we wanted in the column. I am interested in a regenerative receiver; is it worth building? I am also interested in surplus gear for Novice use.

"In last month's issue you asked for ideas for a power amplifier for low-powered rigs like the Ameco AC-1. I, like many other Novices with cheap, low-powered rigs would be interested in it. How about a 6146 or two?

"I have been licensed since last October and have a WAS of 21/19. I have my RCC. I would like to sked anybody for a new state or just a good rag-chew. Keep up the good work, Walt and 73, Woodie."

Thanks, Woodie, I'll do my best to keep the column coming along for all of you Novices and Technicians. Your letter gave me ideas for a couple of projects for future columns, and I'm quite sure someone will sked with you since Mississippi is one of the harder states to work and confirm. Get that N out of the call and let me hear from you again soon.

Alan Kellogg, 1519 Avenue Q1West, Palmdale, California will be making paths to the mail box until that ticket gets there and then he will be pestering the same mail-man for QSLs every trip afterward. Alan says: "Dear Walt: . . . I am 10 years old and in the fourth grade at Juniper School. Last week I took my Novice test and today I found out that I had passed.

"We are going to the ARRL convention at Disneyland in three days. My dad is W6KPR. I am very excited about hamming. Yours truly, Alan."

Congratulations, Alan. Get on the air and work everyone that calls you and be sure to get that General ticket. Write me as soon as you get going and let me know how you are doing. By the way, Alan, what about your sister? Aren't you going to teach her and get her going?

Alan Kellogg, WV6??? Palmdale, California has passed his test, but is just demonstrating proper operating procedures to his sister now. Move over dad, you've had the rig for years!

Gary Liff, WV2RUH, 2336 Batchelder Street, Brooklyn 29, New York writes: "Dear Walt: I took my Tech on April 24, I hope to convert the V to an A.

"Since you took over the NOVICE COLUMN, I have enjoyed it very much. I read it every time I get a chance. Your first article on power supplies really gave me a boost towards building *my* power supplies.

"As a Novice I have not been very successful in getting out although the rig is an Eico 720. I think the Eico 720 is a wonderful rig but I don't have much of an antenna. About three weeks ago my father brought home a 2 meter rig. I use a 5 element beam. I think 2 meters is terrific. My father is "Milt," WV2RUI.

"Good luck on the column and 73, Gary."

Thanks, Gary, for the letter and, by the way, I have so far received 23 letters regarding the article on power supplies, all good. I guess it would be a good

idea to go a couple of steps further on power supplies. Power supplies are a lot of fun to build and making a super-duper one from some piece of junked equipment is a real pleasure. For instance, I bought a transformer at a hamfest for two dollars and used it to build a power supply for a 600 watt rig. The funniest thing about this was the fact that the fellow selling me the transformer thought I was a beginner and politely informed me that when I gave him the money for the pile of iron and copper, the deal was settled, as far as getting my money back was concerned. If he has 10 of those things I'll take them *all* at the same ridiculous price! You see, I've discovered ten ways to use this piece of "junk." This is the reason that I always say, 'Use your Handbook and your head.'

I have often wondered what happened after I put a letter in the column. Was it read by anyone and what happened to the people that wrote the letter? Well, here is one answer. Dan Lindsey, KØEVZ, 1011 Second Street, S.W., Mason City, Iowa sends along this note.

"Dear Walt. Just a note for the NOVICE COLUMN. I just finished reading your column in the May issue. I was especially interested in the lad who has had such good luck running only 15 watts to the Ameco AC-1 rig.

"I told you about a contact with WH6ENH in my last letter and here is some more dope on this contact. Tom, WH6EHN, will be very happy to sked and work anyone who is needing Hawaii for WAS. He is a really nice and cooperative fellow, and will do everything he can to help. He has the following set-up: DX-100 running 75 watts to a Windom antenna, receiver is a Super-Pro. He can be found at about 7175 at 0000 or so, Hawaiian Standard Time. I can hear him pretty well even now (QRN). He really puts out a walloping signal here.

"On May 20th at 0400 GMT there will be a sked between WL7EAE and KØEVZ. This sked will be more of the current experiment here at KØEVZ which is attempting to make WAS using only six watts input on 40 c.w. We surely hope it goes off all right. I will be looking for you on the air, Walt.

"Thanks and 73, Dan."

With an Eico 723, an S-40 and dipole 35 feet high and operating on 3747 and 7177. WNØARD has worked 24 states, all confirmed except Missouri and Louisiana. Jim is 15.

Minnesota has at least one Novice that reads *CQ* and the NOVICE COLUMN. Jim Smith, WNØARD, 311 West 8th Street, Morris, Minnesota sends the news of his area.

"Dear Walt: . . . I hope my call (WNØARD) will soon be changed to WAØARD. I've been licensed since November 6 and have a WAS of 24/22, I need QSLs from Louisiana and Missouri.

"The rig is an Eico 723 and an S-40 receiver with a dipole about 35 feet high. I work 3747 and 7177 at about 4:00 P.M. on week-days and on week-ends I operate at any time. I belong to the ARRL, the AREC and have been nominated for the RCC.

"I have a few buddies on the air I would like to mention. They are KØJOA, Roland Default of Crookston, Minnesota, WNØAFX, Bert Regnier of Akeley, Minnesota and WNØACI, Bill Ham of Sherburn, Minnesota. I wish to thank WØQVD, Ed Setterholm and WØNYI, Orville Braaten for all their help.

"By the way my age is 15 and the photograph was taken by Jim Winter.

"I enjoy the NOVICE COLUMN very much and I am sure many other Novices and would-be Novices do too. So keep up the good work. 73, Jim."

Our DX contact for August comes from way down under. This is the first letter to NOVICE from Australia and it is the fifth continent heard from on this stint as NOVICE editor; we still haven't heard from Africa. Peter Drew, 84 Adelma Road, Nedlands, West Australia writes:

"Dear Walt: I notice in the *CQ* magazine that you have a section for reader mail. Well, here in West Australia I find that Novices come in fairly well between 0800 and 1000 GMT during the months of April to September mainly. I hear them around 7170 and they consist mainly of WV6s.

"I have sent several reports to Novices, but no replies as yet. My receiver is a 6 tube dual wave Philips 1935 model which has no r.f. stage. I use a 3 tube regenerative receiver as a b.f.o. My antenna is a ½ wave 40 meter dipole 20 feet high running East and West.

"The most recent occasion when I heard Novice stations was on 20th of May at 0838 to 0843 GMT when I heard WV6URP, WN4EZW and WNØARR, all with readability 4 and strength 4. I will write and let you know how reception is here if you like. Please let me know if you would like further reports. 73 and good DX. Peter."

Thanks for the letter, Peter, and I'm sure that the readers of NOVICE will answer your reports. A letter from you would be appreciated at any time. I have always said that less calling and more listening would result in more contacts and less QRM. A procedure that is all too common is that of calling CQ 20 times or more only to sign once or twice at a speed far beyond the operator's ability. A good, well sent three by three CQ at your receiving speed will result in many more good QSOs.

Help Wanted

If you need help in getting started and preparing for your examination or if you have a problem that must be answered in person by some local ham, we can help by putting your name in this section. Someone will surely offer to assist you with your problem. Don't forget we have a lot of readers who are good hams and who will offer to help you if you have tried to help yourself. Give it a try. Send your name, address and telephone number to the address at the head of the column. Can you help any of the following people?

Gary Moser, Box 235, Wathena, Kansas wants a General nearby to check his code and give him the test.

James Sipple, 167 Orchard, Elgin, Illinois, Phone OW 5-1639 wants help with the code and technical guidance.

Stephen Clifton, WV2TYF, 800 West End Avenue, New York 25, N. Y. needs help to get his Eico 720 going.

Joseph C. Pierce, 3210 Fayetteville Street, Durham, North Carolina needs help.

Lester V. Lohrman, 2053 Ferry Street, Easton, Pennsylvania needs someone to check and correct code, check the rig and give the test.

Carl Jones, 814 North Stevens Street, Thomasville, Georgia needs a local General to check his progress and possibly give the Conditional exam. I looked up the city of Thomasville and find that it has a population of about 16,000, so he should have little trouble getting help. Check the YMCA and the local Radio Clubs; they should be able to help.

That just about winds it up for this month. I hope you are keeping up your code practice this summer and that you've worked some good DX. Someone in your neighborhood could probably use some help or maybe you can get someone else interested in ham radio, just look around. I'll see you next month at the same old newsstand just in case you don't subscribe.

73, Walt

The USA-CA Program

BY CLIF EVANS*, K6BX

ONE-HUNDRED and five USA-CA certificates now adorn the walls of that many worthy hams. The last issue brought you up to date with all winners through USA-CA-500 number 84 and USA-CA-1000 number 6. It is with pleasure we add the following fourteen winners including W1HOY, number 88, previously listed:

USA-CA-500

PZ1AX	85	W8AL	92
K4ADU	86	K9QBV	93
W6FGJ	87	W2ETS	94
W1HOY	88	K8TBR	95
VE3RN	89	W7NNF	96
WØIJM	90	W6JNX	97
W5BUK	91	W6QIL	98
		K4JIG	99

Late comers interested in achieving the USA-CA award pictured in July issue, page 73, are invited to peruse latest rules published in May issue or if that issue is not available, send s.a.s.e. to K6BX for copy of the program. Feel free at same time to ask for complete revised rules for *CQ*'s WPX, WAZ and SSB awards programs. Fact is, if you put about 8 cents of stamps on envelope, we'll load you down with lots of interesting goodies. Reason we ask for s.a.s.e. is double; First that *CQ* rag doesn't provide these poop sheets; they are pages out of our *Directory of Certificates*, and secondly s.a.s.e. saves us valuable time and money which we never seem to have enough of.

We Get Letters

KØHUU; "A word of praise to you Clif. I'm most pleased to have the USA-CA certificate on the wall. A truly beautiful piece of art work and printing that any ham would love to display in his shack, Jon."

KØVFY; "CHC and USA-CA have put some *Espirit de Corps*, life and purpose or whatever you choose to call it, back in hamming, Dick."

K4RNS: "I am one of your many admirers and never cease to wonder how you manage so many worthwhile projects . . . continue in your inimitable way, Marge."

W2FLD; "There's really only one word that can describe the USA-CA certificate, namely, 'WOW'! Stan."

G2BVN; "I feel you have made many valid points Clif and more power to your elbow. I follow the new USA-CA feature in *CQ* and am sure it is opening the eyes of many people. . . . Fire-eater Evans we call him in UK-land, Steve."

WPE3DJW; "Congrats . . . about time we s.w.l.s got a good strong voice, David."

DL4-1152; "A thousand thanks for the excellent write up on we 'Country Cousin S.W.L. Outcasts,' Lewis."

W1HOY; "Just a quickie Clif to say I received the beautiful USA-CA certificate and that it is just out of this world . . . Well worth working for. I keep all my awards filed in a folder but USA-CA is one I'll frame for display, Helen."

WPE7AIW; "Read your USA-CA column with great interest as do many s.w.l.s because we feel you understand our s.w.l. natural interest and fraternal association with hamdom, Rog."

F9BB, "This USA-CA is one very nice beautiful award and I am very happy to possess it, Louis."

K8MMO; "Many thanks are due you from all hamdom for support you are giving worthy programs, David."

County Expeditions

Speaking of County expeditions especially to those 'rare' ones, we get many notices of such junkets; however, most fail to recognize that we are required to get copy to those New York Editor blokes at least sixty days in advance, so we just can't give publicity unless such trips are planned well in advance and due notice received.

Here's one that just beat deadline: Kurt, W8IBX writes . . . "People all over the country are rushing off on vacation and what not to seldom heard counties . . . can't be outdone . . . W8IBX/8 and K8MTI/8 will activate Ohio's rarest county of Vinton, Saturday, August 11 from 1500 GMT to 2355 GMT using 14072, 7036 and 3580 c.w. and 3860 a.m., S.a.s.e. appreciated."

QCWA Correction

June column listed WØVBG as tied for second place in Fifth Annual QCWA QSO Party according to information received from QCWA. We are now pleased to report it was none other than Old Goat OSCAR, WØVBQ, who tied HC1AGI for second place, and was runner up to W4FNQ in first place.

Tennessee Joins USA-CA Program

The Mid-South Amateur Radio Association, MARA, announces a Worked All Tennessee award, WAT, for working 75 of Tennessee's 95 counties. The club also will sponsor a King Cotton award for working Memphis stations after June 1, 1961.

This is the OOTC Award, in six classes sponsored by The Old Old Timers Club for working 10, 25, or 50 members anywhere or 25 members in 25 states or 50 members in 40 states or Class AA for 100 members in all 50 states. To get this attractive award apply with certified list of QSLs on hand together with $1 handling fee to OOTC Awards Chairman, K2BX, Merrill Beam. Endorsements for all one band or mode.

*United States of America Counties Award Custodian, Box 385, Bonita, California.

Full details and pictures will be carried as soon as certificates come off the press. Eager Beavers may make inquiry to Bill Egbert, K4JIG, 761 University, Memphis, Tennessee.

Florida A.R.E.S.

FLARES sponsors two awards, one for working members in several classes (see picture) and a second for working members who are flying hams. In the second case the award has a special FHC endorsement showing picture of an aircraft.

While writing this (June 4th), we received FHC application from Rev. Charlie G. Hinson, EL5A, who is a missionary jungle pilot with the Assemblies of God in Liberia . . . who has logged over 1000 hours flying a 1961 Cessna Skyhawk during past two years. Yes, many exciting folks are FHCers.

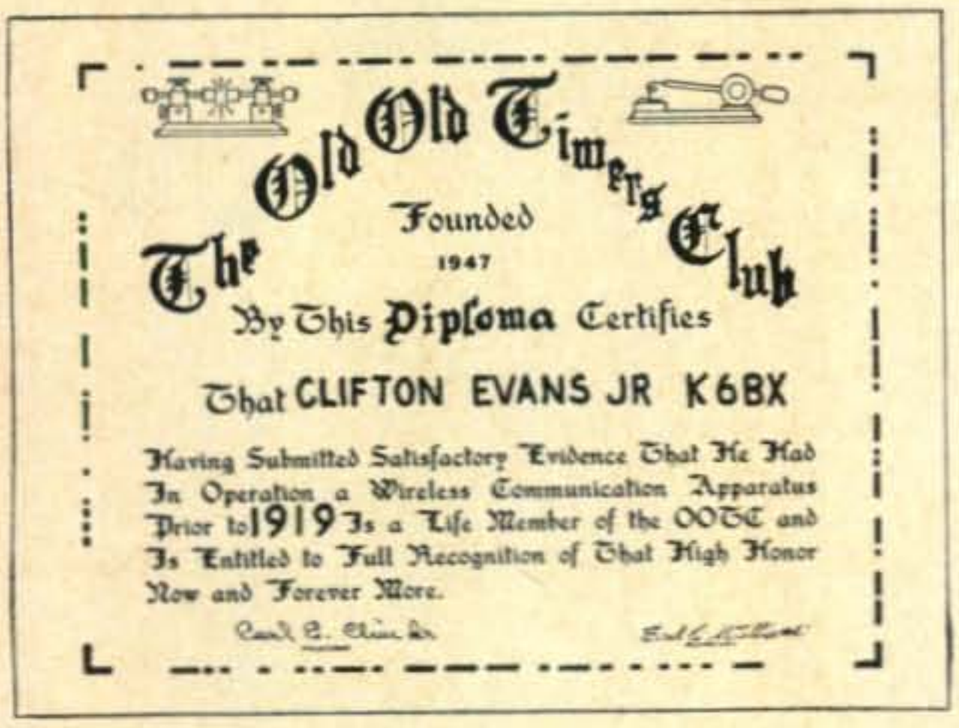
Here is the new Florida League of Amateur Radio Enthusiasts, FLARES, Award sponsored by the Central Florida Groundwave Club, Orlando, Florida for working club members. Six classes are: C, for five members; B, for ten and A for 20 with DXers required to work only three, five and ten respectively. Endorsements are given for all one band/mode operations. A special FLARES/FHC certificate (as shown) has endorsement for working members who also are members of the Flying Hams' Club. See story. To get this award, send full log data of confirmed contacts with $1 or 10 IRC to K4VQP, Box 811, Orlando, Florida. Number one FHC endorsed award went to VE5IJ. The award is co-signed by the Mayor, City of Orlando.

Country Cousin SWLers

Our recent editorial about League non-recognition of s.w.l.ers even as second or third Country Cousins, brought a flood of "thanks" both from s.w.l.ers and hams who joined the League via s.w.l. route. Seems we must have hit a 'nail' in its center head.

There are three categories of s.w.l.s; first there are what we call the transient s.w.l. who aspires to become a ham and in due time joins hamdom's ranks. In most countries hams first were s.w.l.ers. The second category of s.w.l. is one whose primary interest is in Broadcast Listening either radio or TV, with hobby centered on an international basis. A third category we label as Professional s.w.l.ers whom we describe as s.w.l.ers who get complete enjoyment and satisfaction from hunting the bands, both commercial and amateur frequencies, and who are interested in achieving both commercial and amateur type QSLs and awards. Both categories one and three s.w.l.ers are highly interested in the hundreds of amateur award certificates now available to them on a heard basis.

According to our records, the outstanding 'professional' s.w.l.er in the world is Nathan Rosen, WPE2CY/W2-6893, who holds over 175 awards, most of which are amateur-radio sponsored. Here's Nathan's story. When Nathan's brother became W2KNP in 1938, Nathan shared his receiver as a s.w.l. During WW II Nathan served as a radio operator in the Recon of the 5th Armored Division, better known as General Patton's Victory, Grey Ghost Division. Wounded in action, Nathan spent seven months in hospitals and finally was given medical disability discharge. Nathan picked up his interest in s.w.l.ing again in 1954. He now is with RCA Comms. in New York City. Half of Nathan's awards are "Firsts." He has 300 countries confirmed along with all 40 Zones. Yes, we'd say Nathan is our "First Cousin" and belongs along with thousands of other similar s.w.l.ers . . . in hamdom's fraternal ranks, where they may cast their 'political' vote on 'our' side.


The Old Old Timers Club

Founded 1947

By This Diploma Certifies

That CLIFTON EVANS JR K6BX

Having Submitted Satisfactory Evidence That He Had In Operation a Wireless Communication Apparatus Prior to 1919 Is a Life Member of the OOTC and Is Entitled to Full Recognition of That High Honor Now and Forever More.

Above is the membership certificate for The Old Timers Club founded in 1947 for folks who have been pounding brass forty or more years. If you now hold a ham ticket and made a two-way contact either amateur, commercial or military, forty or more years ago, then you are eligible for membership and should contact the Secretary, Earl C. Williams, W2EG, 507 Wayside Road, Neptune, N.J.

We have received scores of letters from s.w.l.ers who belong to the League and/or buy *QST*. We suggest that if enough s.w.l.ers and licensed amateurs who appreciate the fact that s.w.l.ers are our fraternal 'kin,' write letters to 'our' League, then possibly new leadership will emerge and our 'house' may be put in better order. A good start would be for the League to make its awards available to s.w.l.ers on a heard basis as are major awards of most other countries and similar Leagues.

While we are on the subject of U.S. s.w.l.ers and their non-recognition plight without national-level representation, we suggest that as an interim measure all U.S. s.w.l.ers join the American S.W.L. Club, 3510 Garfield Ave., Kansas City 7, Missouri. The club's *News Letter* also would be of interest to any amateur. Also, many amateurs will be shocked to learn that as a group, s.w.l.ers have shown far more interest in the educational factors of international communications and also in people-to-people communications both by radio and correspondence . . . yes, we hams have much to learn from our s.w.l. 'cousins' and they are a credit to our ranks. It's high time we cultivated them.

Never Ending QSL Problem

The QSL card is an integral part of any ham radio communication and is the follow-up con-

The USA-CA Certificate made its debut at recent Dayton Hamvention. Arne Trossman, W2DTJ, Bloak Editor, had the honor of presenting the new wallpaper to Les Jeffrey, W8WT (left), and Dick McKercher, WØMLY. Seated are Goodwin L. Dosland, WØTSN, President Emeritus of ARRL and Dan McCoy, W8DG, Toastmaster, with his wife. WØMLY is now DXpeditioning in Africa providing new countries for thousands of amateurs. (See page 57, this issue.)

firmation courtesy. Actually, few hams are so selfishly introverted that they fail to recognize and facilitate this courtesy; however, many well meaning hams are thoughtless, forgetful, and just never get around to the act of QSLing . . . and some find themselves so far behind in obligations that catching up becomes a chore, self created.

This writer would like to suggest that time to make out a QSL card is during actual QSO. As a practice we find plenty of time during an average QSO to fill out log, make a card index file-card which includes QSLing data, and make out the QSL proper along with placing it in an envelope showing call for follow-up and addressing before day is over. If one is a bit organized, it really isn't a chore but actually adds to fun of contacts. Rather than write down pertinent data about the other fellow on scratch paper to be thrown away, we jot it down on a file card and amaze the bloke with our memory on next contact. Same for QSL cards; we file them by states and countries in handy file cabinets and can quickly locate one for reference. Likewise, a flip of a few cards in file tells us QSL score on any station, and we don't have to research back through reams of 'cold' logs searching for each bit of desired info on awards or any other matters. We just can't imagine a real active ham who doesn't maintain a simple card index file covering all contacts made. Such files are easy to keep up once established and they simplify a thousand and one followup functions with a wealth of catalogued informatiin. Try it, never too late.

W5RU, has a flimsy flyer he sends along with QSLs; it reads like this:

Ohio Amateur Radio Society

Cardinal Award

This is one of a series of Ohio's Cardinal Awards sponsored by the Ohio Amateur Radio Society. Read text for story.

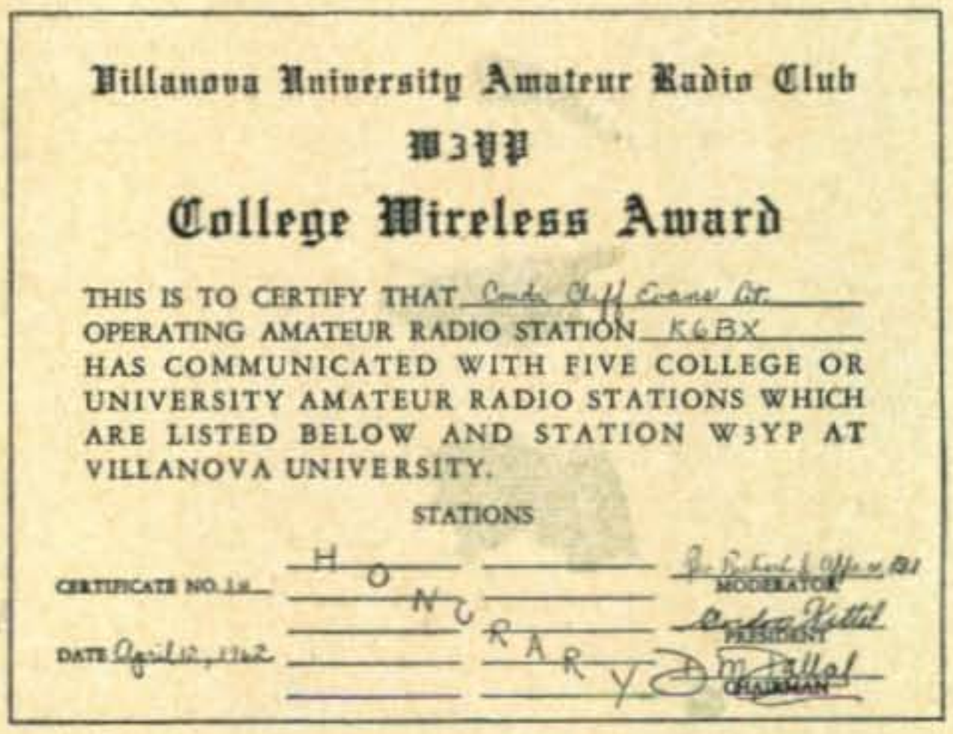
"All through life we carefully preserve documents showing that in the year so and so we were born, vaccinated, married, promoted, acclaimed, honored, and finally retired. These are valuable to all of us.

"The QSL card which the ham finds in his mail box is his document of a worthwhile contact, tangible proof of his accomplishment.

"Without QSL cards there would be no WAZ, WPX, USA-CA or other awards of any kind and the pride of accomplishment could not be realized.

"The ham who works hard for his ticket, sets up his rig and makes worthwhile contacts looks forward to a QSL card for confirmation.

"Not all hams are interested in QSL cards but those of us who take the trouble to send QSL's of our own accompanied by the necessary IRCs or stamps of the country worked and an s.a.s.e., deserve a little consideration.



Villanova University Amateur Radio Club

W3YP

College Wireless Award

THIS IS TO CERTIFY THAT Conde Cliff Evans Jr.
OPERATING AMATEUR RADIO STATION K6BX
HAS COMMUNICATED WITH FIVE COLLEGE OR UNIVERSITY AMATEUR RADIO STATIONS WHICH ARE LISTED BELOW AND STATION W3YP AT VILLANOVA UNIVERSITY.

STATIONS

CERTIFICATE NO. 18 — H O N O R A R Y

DATE April 12, 1962

MODERATOR

PRESIDENT

CHAIRMAN

Above is the Villanova University Amateur Radio Club, W3YP, work Colleges award. See story in July text and listing of 190 colleges and universities having amateur radio clubs and club stations.

"QSL cards make me happy. Won't you please help by sending me *your* card? Thanks and may you be rewarded for your kindness and consideration."

The OLD MAN echoes Roy's feelings about QSLs and believes it mostly a matter of educating hamdom in this matter of a common courtesy and fraternal obligation to fellow hams. While we are quoting Ray, you might be interested to know he's proprietor of world-famous "Antoines" Restaurant of New Orleans which has been a function of his family for over a hundred years.

Ohio World-Wide Contest

The Cleveland Amateur Radio Convention, Inc., sponsors of the Mid-America Radio Convention, announces a world-wide contest from 1700 GMT September 8 to 2259 GMT September 9, 1962.

Contest awards will be issued to highest scoring station in each state, Canadian Providence and foreign country (with five or more contacts). The three highest scoring Ohio stations will receive certificates. The Ohio Amateur Radio Society will award the Cardinal "E" certificate to any U.S. or Canadian amateur working 45 countries during the contest, and to any DX station working 25 counties in Ohio. Also, those submitting contest logs may claim credit toward any of the Cardinal Awards at a future date. See November 1961 issue of *CQ* for full info on Cardinal awards.

Above is the colorful award sponsored by the Cleveland (Ohio) Police and Fire Amateur Radio Club for working 10 members for Ohio stations, 5 for other North America stations, and others only 3. Send log data (no charge) to club, 310 Carnegie Ave., Cleveland, Ohio.

Ohio's contest is the second contest, world-wide, which places emphasis on working counties; first such contest was the CHC/HTH in June this year. For scoring purposes, Ohio stations multiply contacts by total states, Canadian Provinces and ARRL countries worked during contest. All others outside Ohio multiply number of contacts during contest by number of different Ohio *counties* worked.

Contest sponsors suggest operation on or near the following frequencies: 3600, 3860, 7100, 7250, 14100, 14250, 21050, 21350, 280050, and 28750. Call "CQ Ohio." Exchanges will consist of report, name of state and name of county for U.S. hams, and for others; report and name of Laan, DOK, Canton or other identifying similar sub-division. All contest logs must be postmarked not later than September 30, 1962 and sent to Contest Manager, Jack Siringer, W8AJW, 2972 Clague Road, North Olmstead, Ohio.

For a contest centered toward one U.S. state, much activity is promised because Ohio is one of the world's most active ham centers. Likewise, Ohio clubs and organizations sponsor many other attractive awards for which contest contracts (confirmed) will count. These include Ohio's Buckeye county award (See November 1961 *CQ*), a group of awards by clubs affiliated with the Cleveland Council, and many others, details of which are covered in K6BX's *Directory of Certificates and Awards.*

New Orleans Amateur Radio Week

Achievement Award, announced by the Mayor of the City of New Orleans when he declared the

Above is pictured the attractive three-colored DX-100-YL award sponsored by The *Monitor* for 100 confirmed contacts with DX YLs since March 1, 1956. To get this award, send certified list of QSL possession and 25¢ to Custodian, W5JCY, 316 East Hurd St., Edmond, Oklahoma. The award also is available to s.w.l.s. First DX-100-YL was issued to KP4CL, Alicia Rodrigues. (See page 102 last month).

period August 27th through September 3rd, 1962, "Amateur Radio Week." One thousand of these certificates, signed by the mayor, will be issued for contacts with stations in the Greater Metropolitan Area of New Orleans which comprises the Parishes of Orleans, Jefferson, St. Bernard, and Plaquemine; U.S. stations work 5 and all others just 1. Qualifying period is 0600 GMT 8-27-62 thru 0600 GMT 9-3-62 and applications with log extracts only and 10¢ or 1 IRC must be post marked before 29th September to New Orleans Amateur Radio Week, 211 Sycamore Drive, Metairie, Louisiana.

QSL Card Design

All of us appreciate QSL design showing individuality and asthetic tastes; however, such cards which do not convey basic confirmation data are absolute failures and sad disappointments to recipients. We suggest that QSL cards, regardless of other design factors, convey the following basic confirmation intelligence: 1. Use the word "Confirming." 2. Use only GMT date/time. 3. Spell out months as numeral series have different date meanings in various countries. 4. Do not use the term "phone" but differentiate between a.m. and s.s.b. and provide for 2×SSB as many awards will not credit cards unless two-way s.s.b. is specifically shown. 5. Name your county along with full QTH. 6. Do not mislead others by falsely listing as member of a club when actually you only have their award . . . list clubs to which you belong sepa-

New Orleans achievement award. See text for full details.

Pictured here is "The Hiawatha Land Certificate" sponsored by The Upper-Peninsula Young Ladies ARC for contacts with fifty amateurs in the Upper Peninsula of Michigan and five members of the UPYL club. To get this award send log data of confirmed contacts which has been certified by two other amateurs, together with 50¢ to Zelma Neault, W8HAV, P.O. Box 483, Marquette, Michigan. A directory of 360 UP amateurs is available from K8TGX, Rt 1, Ironwood, Michigan, for $1.

rately from awards held. As example, unless properly presented, a listing of holding say the QCWA award could lead others to believe you are a member of QCWA and your card a credit toward QCWA awards. In this day of awards it is more proper to make a separate listing (if used) stating your card may be used as credits toward certain awards. As example, K6BX's card states: "Awards credit for HTH, OOTC, QCWA, FHC, SDCC, and San Diego County." We suggest this procedure both because it is intelligence desired by most QSL card recipients and secondly it removes all doubt if awards held also are listed on cards.

While on the subject, take one of your QSLs and 'mark' the above data on it as a reminder that on next procurement, especially from commercial venders of QSL cards, you will insist on an intelligent format and reject many of the miserable misfit stock cards now being sold. On this score, individual hams can be the most important force to bring about rapid correction to more useful QSL card formats.

South Africa QSL Survey

DXers the world over still offer rightful complaint that U.S. hams are derelict in both QSL

1962 Queen of the CHCers Kay, K2UKQ, sends along the above AARGAU DER U.S.K.A. Switzerland Certificate of Performance stating she "has fallen afoul of hams situated in more than 45 countries of the European Area" creating good friendship. While picture doesn't show same, it is in multi-color. The OLD MAN opines that good humor as well as good will has a real place in amateur achievements.

obligations and especially the courtesy of naming counties. Max, ZS1ACD, who writes "DX News" in *Radio ZS* prepared a survey of U.S. QSLing he has experienced since January 1954 in which he states that only 30 of 526 U.S. QSLs listed county. We must admit this is a sad sack situation in face of the fact that even before the advent of USA-CA, half of U.S. states had county awards and scores of U.S. awards have always existed for working various counties. Here's Max's tabulation which is self explanatory:

District	*Stns. Worked*	*QSL's Rec'd*	*Average*
W/K 1	114	86	76%
2	169	102	58
3	115	60	49
4	111	63	57
5	35	25	71
6	60	31	50
7	40	24	60
8	96	52	51
9	80	54	67
ø	63	29	46
	883	526	59%

This plaque was jointly donated by the Boston-Providence chapters of the QCWA in recognition of W4FNQ's efforts during the recent QCWA QSO Party.

Max comments that while W8PHJ reported an excellent ZS return of 98%, he has heard complaints that many ZS also are tardy in QSLing.

As does Max, we feel that the past sad-sack QSLing situation mainly has been a lack of 'education' program on part of our 'leaders'! While some 'leaders' have always advocated QSLing, they have failed miserably in intelligently presenting to hamdom all the important aspects and needed requirements serving mass hamdom interests. Major contributors to our sad sack QSL situation also are most commercial card printers who advertise and sell QSL formats utterly lacking in a guide for needed confirmation data.

Pending Basket

Matters previously mentioned and still pending for your information include, among others, announcements of county awards for South Dakota, Iowa, Kentucky, Idaho, new sponsors for Pennsylvania county award, new Georgia awards, plus follow-up pictures of several awards previously announced. As we previously flashed, one publisher is highly interested in providing hamdom QSL cards on a mass basis at reasonable cost; the pot is still boiling. Many other features are brewing.

[*Continued on page 104*]

ham clinic

CHARLES J. SCHAUERS, W4VZO
c/o CQ, 300 WEST 43rd ST.,
NEW YORK 36, N. Y.

SINCE the advent of transistors, we who use them have often been confused by some of the data sheets published by certain manufacturers. Time and time again we have had to do a certain amount of "guesstimating" on which transistor to use for a specific circuit application. We of course fried a few in the process and got angry with the manufacturers.

A modern, well-prepared, informative data sheet should provide those who use transistors with all the necessary information for selecting a transistor capable of performing a particular task, but this has not always been the case.

Many manufacturers worry that their transistors may inadvertently acquire a bad reputation due to misuse by some designers, because there is always the danger of misinterpreting characteristics. So most transistor manufacturers go to a lot of expense to produce data sheets for each of their transistors to prevent misinterpretation.

But the best data sheet available is not worth a tinker's darn if the man looking at it does not know *how* to evaluate and use the characteristics that he reads!

Motorola Semiconductor Products Inc. of Phoenix, Arizona is to be complimented for publishing a bulletin titled, "How to Get More Value Out of a Transistor Data Sheet." This very informative bulletin is available to those who use transistors and is free for the asking.

Space does not permit full reproduction of the bulletin; however, we have been granted permission to quote and paraphrase from it. Thanks to Motorola for allowing us to do this.

Ratings and Characteristics

A rating is defined as a limiting value assigned by the manufacturer, which, if exceeded, may result in permanent damage to the device. On the other hand, a characteristic is a measurable property of the device under specific operating conditions for which the transistor will provide reliable performance.

Absolute Maximum Ratings

Absolute Maximum Ratings are those ratings beyond which degradation of a transistor may be expected. These ratings are established by each manufacturer, based on internal physical construction, semiconductor material and manufacturing processes. Because these are "ratings," most data sheets will not indicate test conditions under which these ratings are specified. Therefore, ratings are the extreme capabilities of a transistor and are not to be used as design conditions.

For example, under absolute maximum ratings, the parameter BV_{CEO} indicates that the B, when placed before a characteristic symbol usually means breakdown. Therefore, BV_{CBO}, BV_{CES}, BV_{CEX}, and BV_{EBO}, are the breakdown ratings of the device. When transistor ratings are exceeded, an avalanche or breakdown condition may take place which will destroy a transistor. Breakdown is dependent upon temperature and certain voltage and current conditions, the combination of which can trigger an avalanche-effect leading to instant destruction.

Figure 1 illustrates the typical output characteristics of a Motorola 2N1530 power transistor (sometimes used by amateurs for mobile power supplies). The absolute maximum voltage BV_{CEO} is 45 volts. The absolute maximum current is 5 amps.

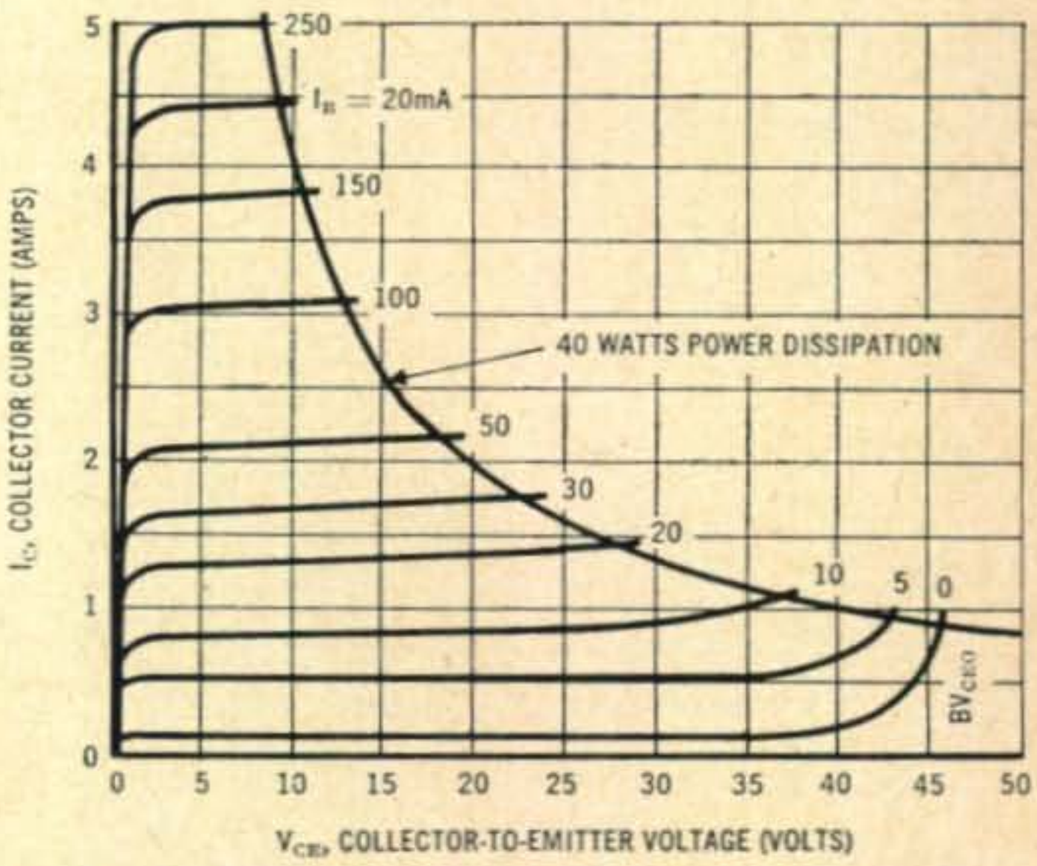


Fig. 1—Typical power transistor output characteristics, Motorola 2N1530.

With an absolute maximum power rating of 90 watts as shown on the data sheet, it is now possible to calculate and plot a maximum voltage-current relationship which can't be exceeded without endangering the life of the transistor.

It is obvious from the graph that the absolute maximum voltage and the absolute maximum current cannot be applied at the same time. While it is conceivable that an occasional excursion beyond this absolute maximum power for a short period of time will do no harm to the transistor, this practice is not recommended where reliability is expected.

Thermal characteristics, also listed under the absolute maximum ratings, are expressed in degrees *C* (Centrigrade) per watt and define the dissipation capability of the transistor regarding the junction temperature in relation to case temperature.

Electrical Characteristics

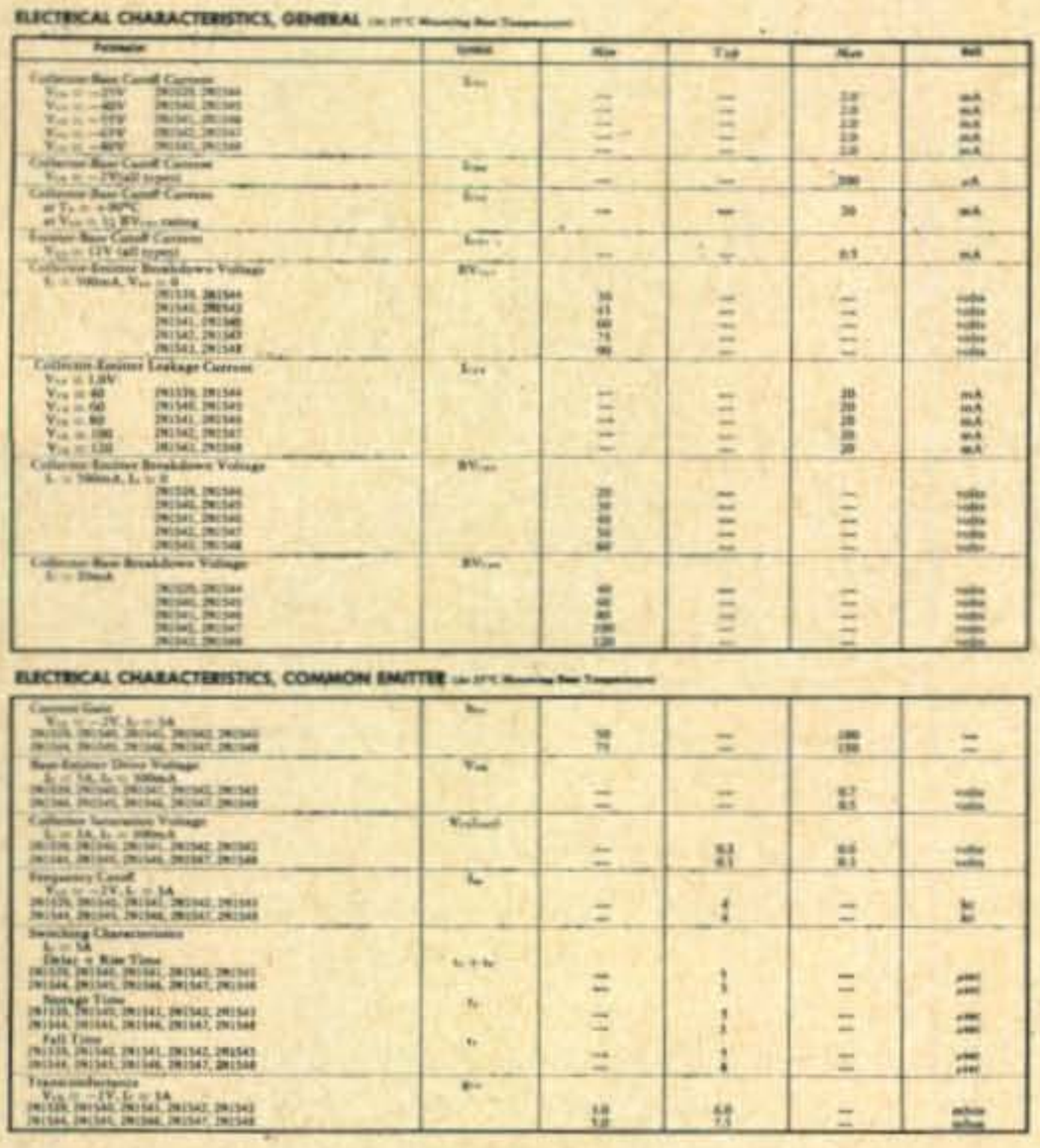
The electrical parameters which are most important to a particular circuit design are contained in that portion of the data sheet dealing with electrical characteristics.

The design centers around which practical circuits can evolve are given by the electrical characteristics. In order for the designer and the manufacturer to have a common understanding on specific characteristics, it is necessary that test conditions be specified.

It should be remembered that almost every parameter listed on a data sheet is subject to variation between manufacturers because of different test conditions, but this need not be confusing if one understands the parameters given on a data sheet.

Figure 2 shows a typical data sheet as prepared by Motorola. Note that it is divided into six general sections. What you can and cannot do with a specific transistor (in this case the Motorola power transistor series from 2N1539 through 2N1548) is shown.

Space does not permit us to discuss each parameter as is done in the Motorola bulletin; but it should be pointed out that in order to use transistors wisely, one should know how the manufacturers obtained their data relating to the operation of their transistors. The bulletin goes into this in detail. If you are interested in transistors, you should obtain a copy of the bulletin—you'll save a lot of time in the selection of a transistor for a specific application.



ELECTRICAL CHARACTERISTICS, GENERAL

Parameter	Symbol	Min	Typ	Max	Unit
Collector-Base Cutoff Current					
V_{CB} = −25V 2N1539, 2N1544	I_{CBO}	—	—	1.0	mA
V_{CB} = −40V 2N1540, 2N1545		—	—	1.0	mA
V_{CB} = −55V 2N1541, 2N1546		—	—	1.0	mA
V_{CB} = −65V 2N1542, 2N1547		—	—	1.0	mA
V_{CB} = −80V 2N1543, 2N1548		—	—	1.0	mA
Collector-Base Cutoff Current V_{CB} = −25V (all types)	I_{CBO}	—	—	200	μA
Collector-Base Cutoff Current at T_J = +80°C at V_{CB} = 1/2 BV_{CBO} rating	I_{CBO}	—	—	20	mA
Emitter-Base Cutoff Current V_{EB} = 12V (all types)	I_{EBO}	—	—	0.5	mA
Collector-Emitter Breakdown Voltage I_C = 100mA, V_{EB} = 0	BV_{CES}				
2N1539, 2N1544		80	—	—	Volts
2N1540, 2N1545		60	—	—	Volts
2N1541, 2N1546		40	—	—	Volts
2N1542, 2N1547		30	—	—	Volts
2N1543, 2N1548		20	—	—	Volts
Collector-Emitter Leakage Current V_{CE} = 1.0V	I_{CES}				
V_{CE} = 40 2N1539, 2N1544		—	—	0.5	mA
V_{CE} = 60 2N1540, 2N1545		—	—	0.5	mA
V_{CE} = 80 2N1541, 2N1546		—	—	0.5	mA
V_{CE} = 100 2N1542, 2N1547		—	—	0.5	mA
V_{CE} = 120 2N1543, 2N1548		—	—	0.5	mA
Collector-Emitter Breakdown Voltage I_C = 500mA, I_B = 0	BV_{CEO}				
2N1539, 2N1544		80	—	—	Volts
2N1540, 2N1545		60	—	—	Volts
2N1541, 2N1546		40	—	—	Volts
2N1542, 2N1547		30	—	—	Volts
2N1543, 2N1548		20	—	—	Volts
Collector-Base Breakdown Voltage I_C = 10mA	BV_{CBO}				
2N1539, 2N1544		80	—	—	Volts
2N1540, 2N1545		60	—	—	Volts
2N1541, 2N1546		40	—	—	Volts
2N1542, 2N1547		30	—	—	Volts
2N1543, 2N1548		20	—	—	Volts

ELECTRICAL CHARACTERISTICS, COMMON EMITTER

Current Gain V_{CE} = −2V, I_C = 1A	h_{FE}				
2N1539, 2N1540, 2N1541, 2N1542, 2N1543		50	—	100	—
2N1544, 2N1545, 2N1546, 2N1547, 2N1548		75	—	150	—
Base-Emitter Drive Voltage I_C = 1A, I_B = 100mA	V_{BE}				
2N1539, 2N1540, 2N1541, 2N1542, 2N1543		—	—	0.7	Volts
2N1544, 2N1545, 2N1546, 2N1547, 2N1548		—	—	0.5	Volts
Collector Saturation Voltage I_C = 1A, I_B = 100mA	$V_{CE(sat)}$				
2N1539, 2N1540, 2N1541, 2N1542, 2N1543		—	0.3	0.5	Volts
2N1544, 2N1545, 2N1546, 2N1547, 2N1548		—	0.1	0.3	Volts
Frequency Cutoff V_{CE} = −2V, I_C = 1A	f_{hfe}				
2N1539, 2N1540, 2N1541, 2N1542, 2N1543		—	4	—	kc
2N1544, 2N1545, 2N1546, 2N1547, 2N1548		—	4	—	kc
Switching Characteristics I_C = 1A					
Delay + Rise Time	$t_d + t_r$				
2N1539, 2N1540, 2N1541, 2N1542, 2N1543		—	1	—	μsec
2N1544, 2N1545, 2N1546, 2N1547, 2N1548		—	1	—	μsec
Storage Time	t_s				
2N1539, 2N1540, 2N1541, 2N1542, 2N1543		—	3	—	μsec
2N1544, 2N1545, 2N1546, 2N1547, 2N1548		—	3	—	μsec
Fall Time	t_f				
2N1539, 2N1540, 2N1541, 2N1542, 2N1543		—	1	—	μsec
2N1544, 2N1545, 2N1546, 2N1547, 2N1548		—	1	—	μsec
Transconductance V_{CE} = −2V, I_C = 1A	g_{oe}				
2N1539, 2N1540, 2N1541, 2N1542, 2N1543		10	6.0	—	mhos
2N1544, 2N1545, 2N1546, 2N1547, 2N1548		10	7.5	—	mhos

Fig. 2—Electrical characteristics of a typical family of transistors as given on a Motorola data sheet.

Choosing A Transistor

Many amateurs merely copy a circuit and use the transistor(s) specified and do not take time to determine whether or not another transistor would be better and offer greater efficiency. It cannot always be assumed that the designer has selected the best transistor for the job.

To be able to pick a transistor for a specific circuit requires some study. Generally, if the amateur-experimenter designs *below* current and voltage ratings (limiting values) he will be successful. But he cannot (as he often does with tubes) "push" his transistors over limiting values without blowing them.

In addition to knowing what current gain, base-emitter driver voltage, collector saturation voltage, frequency cutoff, collector-base leakage currents, breakdown voltages (especially collector-emitter breakdown) the amateur-designer must be able to calculate input and output impedance, overall circuit gain, loss, *etc.*, using the various circuit configurations available.

Most circuits the amateur encounters will be either in the grounded collector or emitter configuration; these are analagous to the grounded-plate or cathode-follower and common or grounded-cathode vacuum tube configurations respectively.

The grounded-base configuration resembles the grounded-grid vacuum tube configuration. This circuit has a low input *Z* and a high output *Z*.

The common or grounded collector has high input *Z* and low output *Z* and the common-emitter circuit has moderate input and output impedances.

To make the task of selection of a transistor easier, many manufacturers willingly recommend specific transistors for specific circuit applications and generally will guarantee a given amount of efficiency.

Before embarking on any construction project using transistors, be sure that you test them! A tester which will indicate shorted, open or good units is easily made up for about $10.00 and is well worth the effort. But it should be remembered that to thoroughly check out a transistor one needs more than just a simple tester.

It cannot be emphasized too strongly, that one should be very careful when soldering transistor leads! Too much heat results in a damaged transistor. Always use transistor sockets when possible. If you must solder leads, "heatsink" them with a pair of pliers, hemostat or some other metal heat absorbing device.

When copying a schematic from a book or magazine make certain that you are using the correct resistors. Too often the decimal point (as has happened before in *CQ*) is so small it "blends" into the numbers it separates—thus a 2.7K becomes a 27K—a lot of difference!

In many cases one can substitute transistors which are less expensive than those called for in a particular circuit. When doing this, be certain that characteristics are within 5% of those of the substituted unit. This 5% margin seems to work well for me.

One last point: when using a transistor to drive a high impedance relay (5K or 8K), use a diode across the relay coil to prevent "spike" damage to the transistor when the relay coil field collapses.

Reviewing The Knight-Kit V.T.V.M.

Before reviewing the Knight-Kit Electronic V.T.V.M. #83Y125 for you, there are a few preliminary points that we would like to make. First of all, we purchased the kit because we had so many inquiries regarding it. The gist of most inquiries ran something like this: "seems to me that Allied Radio Corporation is offering their 83Y125 v.t.v.m. at an unbelievably low price. Tell me, will it do all they say it will do, and is it worth the money?" Before proceeding, the answer is yes, and this answer is not predicated on the fact that Allied Radio is a *CQ* advertiser.

In all fairness to any manufacturer (and to readers) HAM CLINIC will not publish a review on any item unless we are convinced that it operates the way the manufacturer says it does and is worth the money. Being impartial is not the problem. If we test a particular piece of gear and find glaring inconsistencies with published operational characteristics we let the manufacturer know. Regardless of what he says, if he does not correct the deficiencies we found then there is no review.

In reviewing kit items, if we find procedures which will benefit the buyer we notify the company so that possible changes may be made in the assembly manual, and we may mention them in the review.

Another point: to check out electronic gear, carefully calibrated lab equipment must be used, otherwise a review would mean nothing. If the manufacturer (for example) claims 6% accuracy, you really can't check this with another instrument having an accuracy of 8%!

The Knight v.t.v.m. assembled and ready to go. The unit provides extremely high quality at the very reasonable price of $25.95 in kit form.

Description and Test

The Knight-Kit v.t.v.m. is housed in a sturdy metal case 7⅝ × 5⅜ × 4¼". It utilizes a good quality 200 microammeter with a two color 4½" scale. Only 4 control knobs are used. Used as a d.c. voltmeter it covers the ranges 1.5 to 1500 volts full scale in 7 steps. The checked out d.c. voltmeter accuracy after a 20 minute warmup and careful calibration was 2.9801%, at full scale.

The a.c. voltmeter ranges are the same as the d.c. ranges, 1.5 to 1500 volts. The accuracy (after allowing the instrument to cool and reheat) after 20 minutes was 4.989%.

It must be pointed out that instead of using the 1.5 volt battery in the set for calibration we used a Mallory mercury battery which we also used with our $350.00 v.t.v.m. for comparative purposes. We suggest that if you buy the 83Y125 that you purchase a Mallory mercury battery for calibration.

Checking out the ohmmeter which has a range up to 1000 megohms, we found that the accuracy was excellent to 22 megohms. We used precision film-type resistors which were frozen before check-out. After 22 megohms (a range seldom used by anyone—and of little concern as far as accuracy is concerned), recalibration (using the ohms adjust) enabled us to measure up to 1000 megohms with a startling accuracy of 15%! At this range using our high priced job the accuracy hovers around 9%.

The parts used in the Knight v.t.v.m. are high quality. Resistance multipliers are the 1% precision type. A printed circuit board is used which is composed of copper deposited on laminated phenolic.

To minimize heat radiation, a silicon rectifier is used in the transformer power supply. Two tubes, a 6AL5 and a 12AU7 are used; the latter in a push-pull balanced bridge circuit.

Input resistance was measured at slightly less than 11 megohms. On the a.c. ranges, the response (without probe) was 31 cycles to 3.110 mc. The decibel measuring accuracy was within 5% and within the limits of the accuracy of the a.c. specifications.

Using the accessory high frequency probe

we managed to get up to 220 mc response; the measurement accuracy at this frequency as compared to our expensive lab v.t.v.m. was about 5% less. Allied claims that the probe will extend the a.c. range to 250mc but inasmuch as our oscillator frequency limit was 220 mc we could not check this out—but we are very satisfied with the probe operation . . . who will quibble about 30 mc in this case?

We tried decreasing the input voltage to 90 volts a.c. and found that by using the zero adjust our measurements did not change appreciably.

Construction and Use

An inexperienced ham can put this v.t.v.m. together in about 5 evenings or about 9 hours. An experienced kit builder can do it in 4 evenings or about 6 hours.

The instruction manual is easy to read and well illustrated. However, *do* remember that the resistor "left-over" on the card is for the probe and don't look for it in the circuit diagram . . . this happened! This resistor should be labeled "for probe."

Using the meter is a pleasure because its scales are easy to read. Switching from a.c. to d.c. to ohms is quick. If you get "mixed" up on polarity when measuring d.c. voltages, all you need do is to flip the mode selection knob.

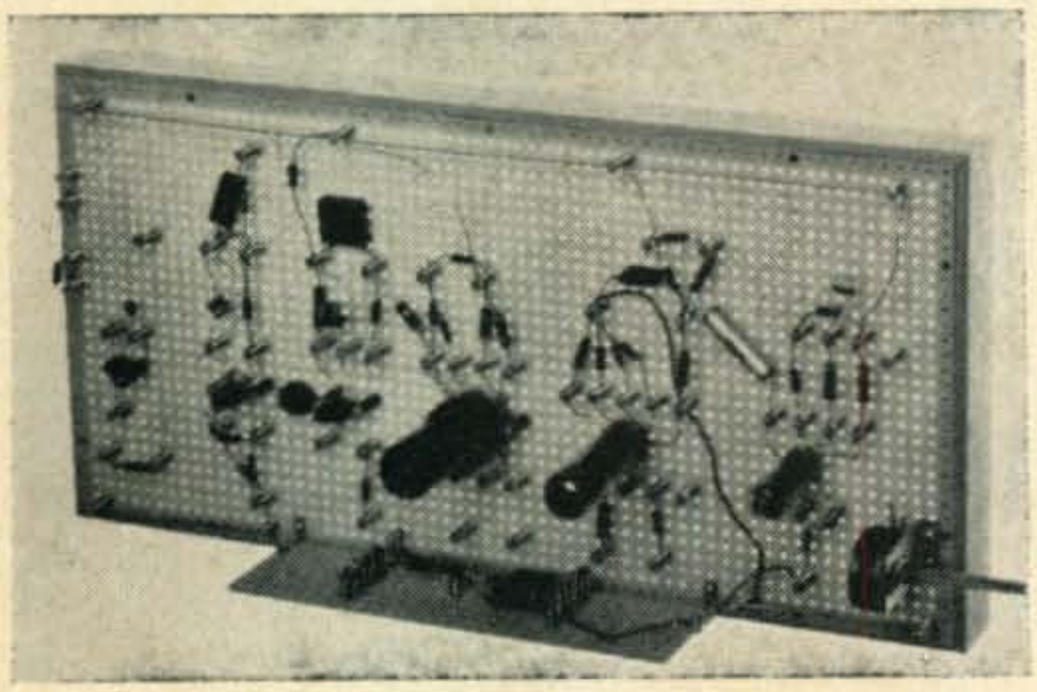
We tried momentarily overloading the meter (as most hams do on occasion) and found that the meter "could take it." But we do not advocate that this be done by the inexperienced!

Yes, for the money ($25.95) it is hard to buy a better v.t.v.m.

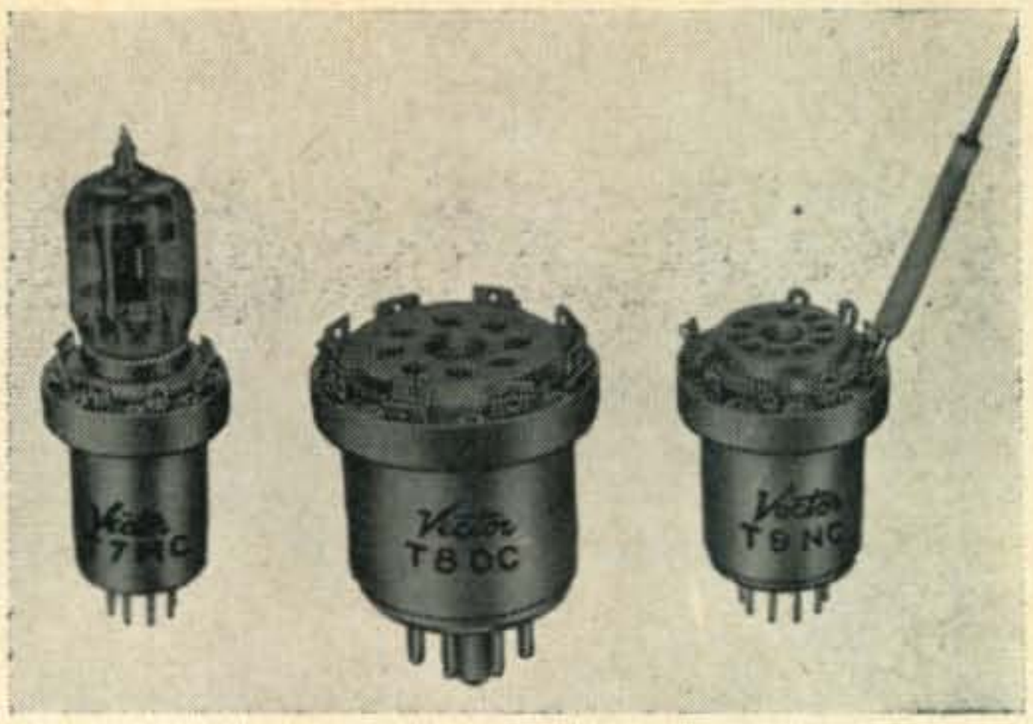
Lab Helps

During the last few months we have been spending a lot of time in the lab. The old perforated breadboard that we have been using finally cracked. In looking for another just like it we stumbled into the Vector Electronic Co.'s 25X experimenter's kit, and without much ado purchased one.

This kit is the lab tech's dream. A complete set, it comes with sockets, quick connectors (including the soldering types). Laying out a circuit is fun and quick . . . no more twisting



Vector Electronics 25X circuit mock-up board. Note the quick-clip solderless connectors.



Vector adapters for measuring voltage and resistance from the top of a chassis. The socket and plug sections are connected together directly with test point terminals brought out from each pin.

wires together or broken capacitor leads. For more info on this fine aid, write the Vector Electronic Co., 1100 Flower St., Glendale 1, California.

Incidentally, while we were at it, we purchased a set of Vector's latest test adapters. These permit you to check resistance (or voltage) in a set by merely pulling out a tube, plugging it into the adapter and then the adapter into the socket, and using the special insert probe furnished. Info on these from Vector for the asking too.

Questions

TV Camera—"Can you suggest a usable TV camera that I can put together myself for under $125.00 for use on the 420 mc band? A few of us are interested in doing some TV work. The surplus jobs we have looked at are, in our opinion, too expensive and too hard to modify. What say OM?"

Well, the best TV camera that one can assemble without much fuss or muss is described in the May and June (1962) issues of *Radio-Electronics*. Believe me, I have never seen any thing better for ham use. Actually, the output of this camera could be transmitted via 420 mc to a 420 mc converter attached to a regular TV set; sound could go on 144 or 220 mc. By using vidicon pickup tubes with small imperfections and winding your own deflection coils, you can really come up with a fine camera for very little money. It would take no time at all to make it work on the ham band.

Low Cost Mechanical Filter—"What's the info on Collins Radio new low-cost 455 kc mechanical filter?"

We do not yet have a spec sheet on the unit. However, it costs about 35% less than standard units due to new design and manufacturing techniques. For more info write the company at 19700 San Joaquin Road, Newport Beach, California.

Transistorized TNS—"I'd sure like to obtain a circuit for a transistorized TNS that I can use with my transistorized auto receiver and converter. Can you help?"

Yes. See page 80 of May 1961 *CQ*. Back issues available from the circulation department for $1.00.

LWM-3—"What's the info on the LWM-3 transceiver? Where can I purchase one?"

In the Nov.-Dec. 1961 and Jan.-Feb. 1962 issues of *Ham News* from General Electric, a transceiver (that looks a little like the KWM-2) is described, by its designers W8WFH and W8DLD. What a fine job they did! For copies of the issues mentioned see your GE dealer or write GE at Owensboro, Ky. You can buy the parts and make one, but you can't buy the finished article.

Needle Sticking—"What causes the needle in an 0-500 ma meter to stick on the left-side? I have to pound it to get it to work. When the current is off it sticks again."

Unless you are adept at meter repair I would suggest that you send it to the factory for an overhaul. However, if you are careful you might try disassembling it, and with a magnifying glass look for a binding point. It may only need a twitch of a pair of sharp tweezers to set it right again. Check the pivot for binding.

Trees for Antennas—"Is it safe to install one end of a doublet in a tree? Should springs be used to hang the antenna? How about a door spring?"

I would never advise anyone to use a tree for antenna installation, but it is being done every day. Personally, I do not like the trouble it takes to install one properly. A door spring will not hold a good 80 meter doublet, but three of them will. Safe? That's a question I cannot answer for it depends on the tree and installation.

ISK for the DX-100—"Where can I obtain information relative to the modification of my DX-100 for frequency shift keying (RTTY)?"

Obtain a copy of the *New RTTY Handbook* by our RTTY Editor, Byron H. Kretzman, from *CQ* for $3.95. On page 123 of Byron's fine book is given the info you seek.

By the way, I had my first brush with RTTY in 1938 and since then have had to worry about it in my regular work. I can say that the *Handbook* covers the subject for hams in an easy-to-read manner—in fact, it contains information that many military training manuals do not.

Whether you are a Novice or an Extra Class licensee and interested in RTTY, the *Handbook* should be on your library shelf.

Transistor Beta—"How about publishing the circuit of a very simple tester for transistor beta?"

See fig. 3. This little tester enables one to check current amplification of a transistor; that is, collector current change due to a base current change. The current gain of a transistor is beta. Good transistors will have a collector current rise of at least 3/10 of a milliampere when the switch is closed, which is equal to a beta of 10. For example, if the collector current should increase to 3 ma, the beta would be

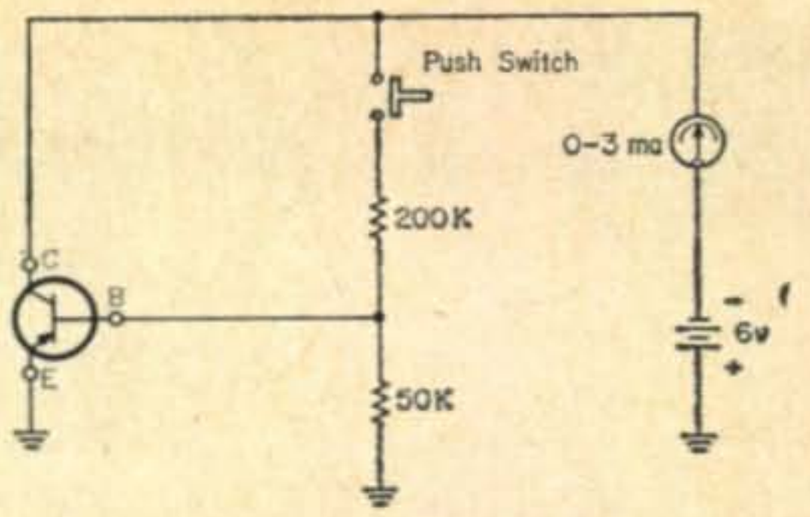


Fig. 3—Simple transistor beta checker. Comparison is made between collector current with and without switch S closed. Battery polarity shown is for p.n.p. transistors and should be reversed for n.p.n. types.

100. If the value of beta you obtain is 25% or less than that specified by the manufacturer, it would be wise to use another transistor.

Noise Limiter—"Can you suggest a noise limiter which I can adapt to my transistorized superhet receiver which works? I've tried a number of schemes without success. How about it?"

Yes, see fig. 4. Choose diodes with a good front to back ratio. Use Mylar type capacitors where you can. I have used this circuit successfully with a three band transistor receiver and it works well.

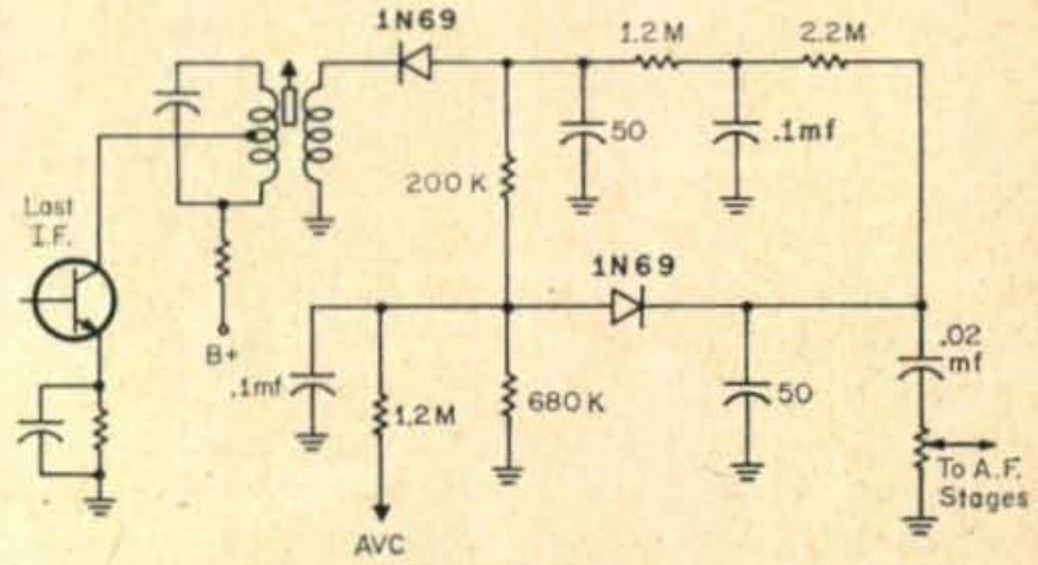


Fig. 4—Series type noise limiter for use in transistor receivers.

Technical Writing—"I'm interested in doing some technical writing, can you suggest some texts which give the fine points?"

The best all-around text I have seen yet on technical writing is published by Philco Technological Center, C and Ontario St. Techrep Div., Philadelphia 34, Penna. Write them for info.

The name of their fine book is, *Technical Writing Guide*. It does cover the *fine* points.

Thirty

Much of the correspondence received by HAM CLINIC comes to our callbook address, but we would prefer that you always send your letters and cards directly to the *CQ* offices.

Our greatest volume of mail is of course during the winter or DX months. During this time we frequently have backlogs of 200 letters or more. Although we try to answer each query as quickly as we can, sometimes there is a two weeks delay. So please be patient and bear with us.

For this month then, 73 and 75. Chuck

RTTY

BYRON H. KRETZMAN, W2JTP
431 WOODBURY ROAD,
HUNTINGTON, NEW YORK

RTTY Operating Frequencies

Nets centered on frequencies given; operation usually ± 10 kc.

80 meters	3620 kc
40 meters	7040 kc
20 meters	14,090 kc
15 meters	21,090 kc
6 meters	52.6 mc

RECENTLY, for some strange reason that we haven't been able to figure out, we have been getting a rash of mail and telephone calls from hams asking about the Model 28 Teletype machine. (In case you didn't know, the older Models 14, 15, 19 and 26 are no longer in production.) Now, most page printer machines in use these days are Model 15's, closely followed by Model 26's. Cost on the above models usually runs less than $100.

We have mentioned before that some Model 28's *do* get into ham hands. Those that do are rebuilt machines, machines that were badly damaged in shipment, fires, floods, etc. Of course those that rebuild this model must purchase new replacement parts directly from the Teletype Corporation, paying list price. (Parts for the older machines are in plentiful supply from many sources.) As the result, a Model 28KSR runs about $400; and, the Model 28-ASR, the page and tape equipment that replaces the Model 19, runs about $1000. (Not "between $2500 and $3000," as reported by WØAGD in a recent article.[1]) For the latest information on the availability of the Model 28, contact W1AFN, W2ZKV, W3CRO, and/or W9GRW.

Oh yes, we almost forgot. If you want more dope on these machines get a copy of the *New RTTY Handbook* directly from *CQ*. The price? $3.95, postpaid.

The AN/ART-13 on RTTY

This month's *Tidy Tidbit of Teleprinter Technology* is terrific, and is through the trials, tribulation, and testimony of Ray Werner, W8-FVP of Cincinnati, Ohio. It is a method of frequency shifting developed by Ray especially for the v.f.o. of the AN/ART-13 but is just as adaptable to any other v.f.o., providing that its cathode isn't grounded. In a nutshell, the TU, or RTTY receiving converter, is made to frequency-shift the v.f.o., either by a.f.s.k. input or by the keyboard keying of a d.c. local loop.

The advantages of Ray's method are:

1. Right-side-up diode keying is possible without relays.
2. A magnetic tape recorder, with a.f.s.k. on the tape, can be used as an RTTY transmitter.
3. Retransmission on an h.f. band, from a.f.s.k. on a v.h.f. band, is easily accomplished.
4. It is easily installed in a transmitter.

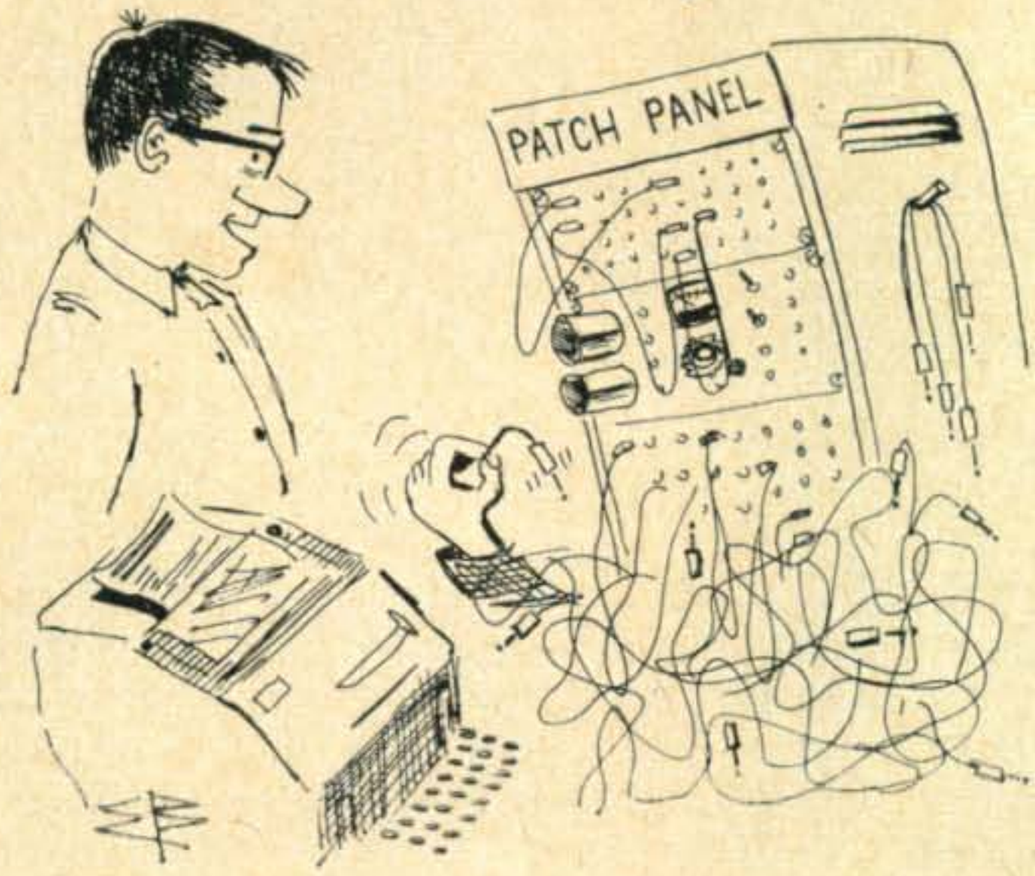
The Circuit

Figure 1 is the circuit used by W8FVP to frequency-shift the v.f.o. in the AN/ART-13. It is necessary that this circuit be incorporated as part of the TU in order to utilize the pulsed voltage developed by the TU from an a.f.s.k. RTTY signal. The simplest way to accomplish that is to use the TU output tube (and its plate supply) as the current supply for the local loop containing the receiving selector magnets.

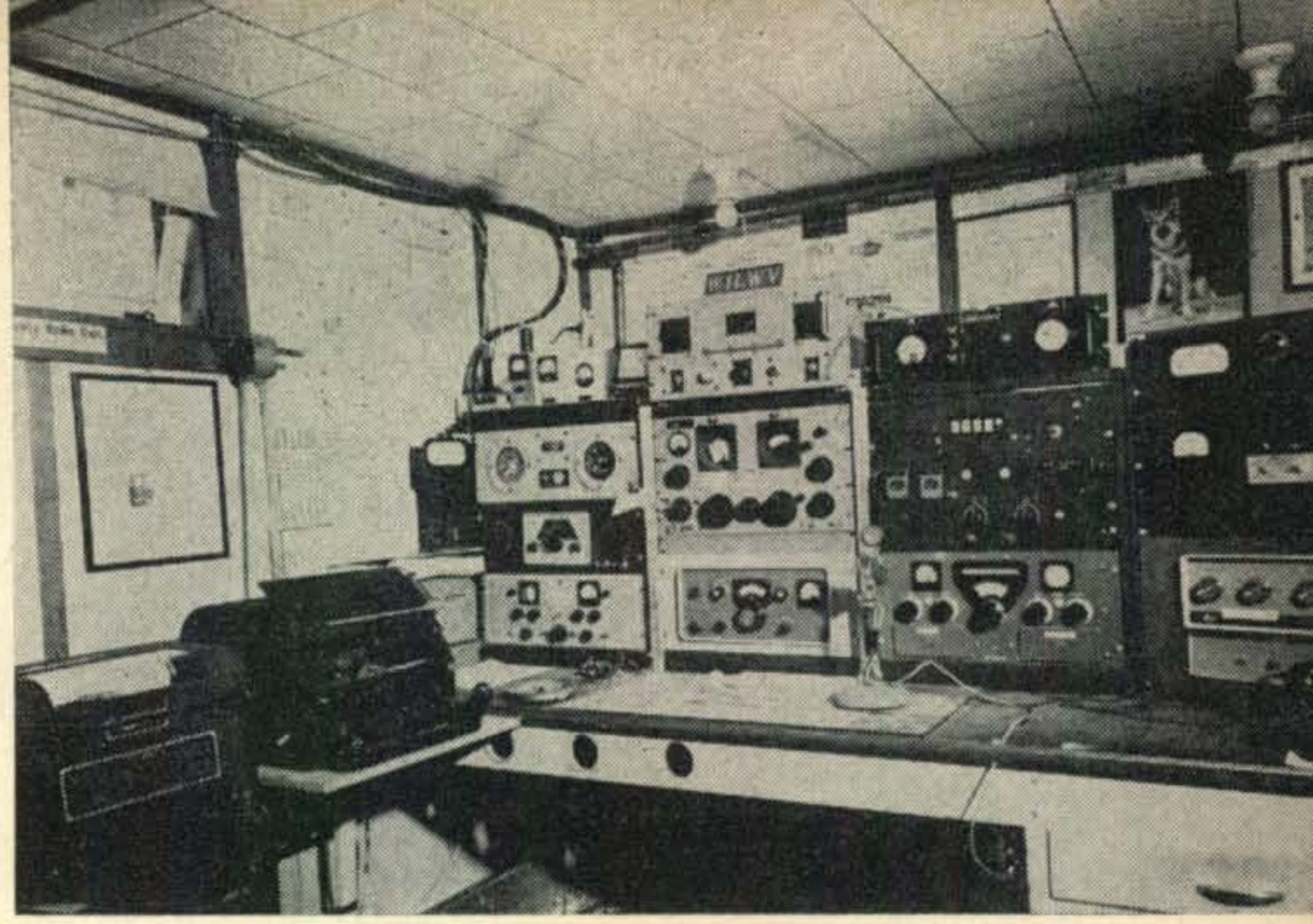
Figure 2 shows the usual TU keyer tube where it is intended to put the selector magnet coils in the cathode circuit. Instead of the cathode going directly to the selector magnets, it is connected via (A) through a meter, the BREAK switch, the keyboard contacts, and the selector magnets. The other side of the selector magnets then goes to ground, either through a 1000 ohm resistor for 20 ma operation or through 350 ohms for 60 ma operation. Resistors R_1 and R_2 are proportioned (or made adjustable) to set cathode and selector magnet

[1] Magnusson, "Getting Started in RTTY," *QST*, June 1962, p. 25.

RTTY The Hard Way . . . No. 13.



"That's what I like about this set-up, neat and efficient . . ."



W1LWV at Millinocket, Maine, RTTY station of Nick Thompson. Machines are Teletype Models 14 and 15, and Kleinschmidt TT-4/TG. Receivers are an SP600-JX and a 75S-1, modified for RTTY. Transmitting equipment consists of a 200-V and a GSB-201 Linear. Converters are a Northern Radio 107 and an FRA. Note the weather instrumentation.

current to the desired value on *mark*. About plus 20 volts then appears at point (X) on *mark*.

When used with the AN/ART-13, the cathode connection to the v.f.o. is made by soldering the wire to the proper pin on the oscillator tube itself, then inserting it in the socket. Otherwise it becomes a nasty job to get to the underside of the tube socket, and it is possible that the v.f.o. alignment might be inadvertently disturbed in the course of work. A convenient place to insert the f.s.k. voltage in the AN/ART-13 (Y) is to use the SIDETONE No. 2 jack after disconnecting and taping the wires there.

By the way, Ray doesn't recommend that his circuit be used with the W2PAT converter since the keyer tube, in the modified circuit, is only in one leg, which doesn't permit noise to be balanced out.

Operation

Assuming that the local loop current has been set correctly as indicated by the meter, and S_1 on the keyer tube is closed, the local loop is first opened by the BREAK SWITCH on the machine while the v.f.o. is set to some convenient frequency, as a reference. The BREAK switch is then released and the amount of frequency shift is set by adjustment of the 10K ohm SHIFT potentiometer.

Local loop keying of the printer, with the transmitter off the air, is done by closing S_1 and operating the keyboard. On-the-air RTTY transmission is made with S_1 closed and the transmitter turned on.

Transmission from a tape recorded or received a.f.s.k. signal fed into the TU is simply made by opening S_1 and turning on the transmitter. This procedure of using the tape recorder, especially with a continuous loop of tape, makes it very convenient to make a repeated call or test transmission, such as RY's. You can record test audio tapes by keying the v.f.o. (only the v.f.o., *please!*) and picking it up with the receiver, either feeding the output of the receiver right into the recorder or by picking up the tones from the receiver speaker with the tape recorder microphone.

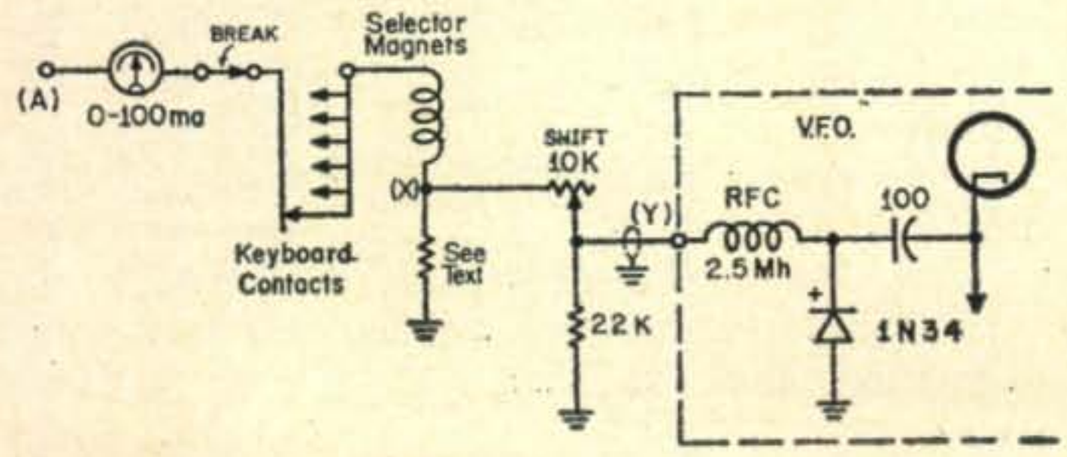


Fig. 1—Frequency Shift Circuit for the AN/ART-13.

Project "Despair"

When we ran the story on W2JAV's transistorized TU and on the a.f.s.k. oscillator a few months ago, we mentioned the difficulty Phil had in obtaining the boards. Well, we stuck our neck way out and said that *we* would endeavor to provide them. (It looked real easy.) Ha! Now we know why Phil calls it "Project Despair." Although photomasters, made available through the cooperation of W2JAV, were sent to a Connecticut printed circuit board supplier, it took months to even get him to give us a price on a lot quantity of several hundred of each of the boards. In the meantime, the mail (the result of a mention that details on the availability of these boards could be had by writing to the RTTY Editor) began piling up. As we go to press (early in July) we *still* haven't gotten the boards. And the mail is still coming.

How patient can you be? If you haven't gotten an answer to your letter by the time that this appears in print, please remember,

[*Continued on page 115*]

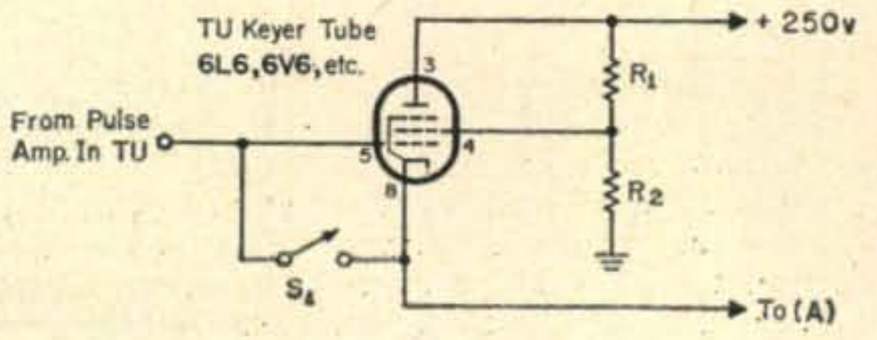


Fig. 2—Typical Keyer Tube Circuit in a TU.

YL

BY LOUISA B. SANDO, W5RZJ
4417 ELEVENTH ST., N.W.,
ALBUQUERQUE, N. M.

THE YLs pictured here are all members of the new YL Chapter of the Certificate Hunters' Club, only the fourth local chapter of CHC to be formed. These are all gals who are "going places" in ham radio—top performers who have earned a minimum of 25 certificates in various facets of ham radio. Since the CHC'ers are go-getters, many of them have been contest winners, or otherwise in the news, and as such their photos have appeared in this column recently. Check back issues (as indicated) for photos of other YL CHC'ers.

Aim of the YL CHC Chapter is to maintain a high level of achievement in line with the original purpose of CHC, namely: 1. Bringing to public attention the contributions amatuers make to the art of communications and to universal understanding and good will among the world's people. 2. Supporting and giving publicity to other organizations and pulbications seeking similar goals. 3. Promoting amateur operations on all bands and by all modes. 4. Giving due recognition to those amateurs who excell in many fields rather than just one.

YL CHC started with charter membership (4-1-62) of 32 YLs. As of May 21 membership includes 45 YLs—in 21 States, 7 countries, 3 continents: CR7LU, Lucia, (*CQ*, Apr. '61, p. 98); DL6VM, Ella; KP4CL, Alicia (*CQ*, July '62); VE7BBB, Eva; ZE1JE, Molly; ZS1INQ, Gwen; ZS1RM, Marge; K1OYM, Faith; K1UGU, ex-KH6DLD, Sheila; W1HOY, Helen, W1YPH, Leona; K2UKQ, Kay (*CQ*, Apr. '61, p. 99); K4RNS, Marge (*CQ*, Apr. '62, p. 96); K4ZNK, Betty (*CQ*, May '62, p. 85); K5OPT, Ruth; K5SBN, Sue; W5DCB, Dotty; W5JCY, Bertha (*CQ*, Dec. '61, p. 84); W5WXT, Inez; K6UHI, Betty; K6UTO, Betty; K6ZKH, Marge; W6YZV, Mable; K7CHA, Bertha; K7IFI, Louise; K8MZT, Shirley, (*CQ*, Jan. '62, p. 86); K8ONV, Mary; W8HWX, Lillian; W8WUT, Avis; K9QGR, Hazel; KØGIC, Dot; KØHEU, Thelma; KØMAS, Libby; KØRGU, Tillie. Associate members: K1ADY, Mary; W1RLQ, Chata; K3HZY, Doris; W4EJQ, Deane; K5BTM, Dot; W5LGY, Helen; W6BIS, Ida; K8MQB, Alice; W9AXV, Dot; KØEPE, Marte (*CQ*, July, '61, p. 100); WØUMO, Alyce.

Officers of CHC No. 4 are: Pres. & General Net Mgr., KØGIC, Dot (alternate KØIKL); V.P., W5JCY, Bertha; Publicity & Secy., K7CHA, Bertha (alt. K5BNQ); Membership & Treas., W1YPH, Leona (alt. W8WUT); By-laws, K8MZT, Shirley; Certificate Custodian, KØRGU, Tillie.

The YL CHC has nets on 15, 20, 40 and 80 phone and c.w.: 1st Sunday of each month, 14.275-80, 1900 GMT, K5OPT NCS; 1st Friday, 21.335, 1900 GMT, W5JCY NCS; 1st Friday, 14.044 (c.w.), 2200 GMT, VE7BBB NCS; 1st Tuesday, 7.250, 1900 GMT, W5JCY NCS.

YL CHC No. 4 plans to offer a certificate. It is currently being designed and rules set up. Details as soon as available.

YLs who hold a valid amateur radio license and have the CHC award are invited to join the all YL Chapter. Dues are $1 per year (no charge to DX YLs). Eligible as associate members are YLs who have earned at least 15 certificates toward CHC.

Howdy Days Contest

Dates: Start Tues., Sept. 25, 1962, 1200 EST. End Thurs., Sept. 27, 1962, 1200 EST.

Rules: 1. Score will be based on licensed YL contacts only.

2. All bands and modes of emission may be used.

3. Only one contact with each station will be counted.

4. Contacts on nets will not be counted.

5. No multipliers will be used.

6. Contest opens 1200 EST Tues., Sept. 25, 1962 and closes 1200 EST Thurs., Sept. 27, 1962.

7. Scoring: 2 points per contact for each YLRL member. 1 point per contact for each non-YLRL member.

8. Submission of logs not required. Submit a list stating date, time, call, name, QTH, and whether or not contact is a member of YLRL.

9. Awards: Top score, YLRL member: choice of pin, charm or YLRL stationery. Top score, non-YLRL member: 1 year paid membership in YLRL.

10. Score sheets must be received by Oct. 14, 1962. Submit to YLRL Vice President K2JYZ, Lillian Byrne, 24 Stillwell Pl., Freeport, L. I., N. Y.

Here and There

WA6RXH, Shirley, will be using a KWM-2 when she acts as traffic manager for the 1962 Soaring (sailplane) National Championship Meet at El Mirage Field, Calif. from July 21-Aug. 3. Anyone interested in working on the project may contact Shirley at Box 298, Santa Monica.

GAYLARK officers for '62 include: Pres., W5CXM, Phyllis; V.P., K5DJS, Mary Jo; S-T, K5VZB, Mary Ann; Historian, W5DRA, Teev.

1962 officers for the Loaded Clothes Line YL net are: Pres., K5ECP, Helen; V.P., KØEPE, Marte; sec., KØZRI, Phyllis; treas., KØGIC, Dot; P/C, K5OPS/Ø, Ethel. During the summer

[*Continued on page 116*]

Some of our lovely YLs from left to right and top to bottom: K9QGR, Hazel Cain, DeWitt, Ill. Lic. '59, OM K9HRC. Two sons, one is WA6CHV, 6 grandchildren.CHC #119, USA-CA #51, HTH; enjoys photography, sewing, writing. VE7BBB, Eva Green, New Westminster, B.C. CHC #421; OM VE7AGC (CHC #324); Stepson VE7BFN (CHC #439); 3 other jr. ops. C.w. NCS for YL Chap. CHC. K6ZKH, Marge Carter, Atherton, Calif. CHC #526; OM K6ZNQ; an RN. K8ONV, Mary Ryden, Birmingham, Mich. OM K8OHG; their two jr. YLs are K8ONW and K8RBB. CHC #374, lic. '59, CPC-20. K7CHA, Bertha Roylance, Harlowton, Mont. CHC #403; OM W7RZY (CHC #370). Lic. '58; secretary & P/C YL Chap. CHC; custodian Treasure State Award; RACES. Enjoys hunting, fishing, sewing. K5SBN, Sue Pierce, Cut Off, La. CHC #490, lic. '59, teaches piano.W5WXT, Inez Cole, San Antonio, Tex. OM W5THU; jr. YL aged 3. CHC #430, lic. '52. Custodian Alamo YLs certificate; pres. in '61. IBM op 16 yrs. with phone co., enjoys photography and music. W1YPH, Leona Peacor, Stoneham, Mass., OM W1GAG; 3 sons, oldest is K1IJU and his MYL K1IJV; 7 grandchildren. Lic. '53, prefers c.w. CHC #114; earned WPX on c.w. Treas. & membership officer YL Chap. CHC. DL6VM, Ella Jacobs, Muenchen, Germany, is mostly active on 20 s.s.b. using 150 watts. Awards include CHC #240, SSB 100 (first YL in Europe), phone WPX #56 with 350 endorsement, DXCC (272), DUF, WAE I, WBE, YL-OM1OCC.! KØGIC, Dot Hall, Wichita, Kans., at v.h.f. station, works 6 meters mostly in summer. CHC #47; president & general net mgr. of YL Chap. CHC.

DX [*from page 69*]

four members of the G.B.A.R.C., all others must QSO three, after January 1st, 1958. Send list showing station worked, date, time and frequency along with three international reply coupons; no QSL cards required, to: Awards Manager, Jack Willis, VO2NA, Aeradio Dept. of Transport, P. O. Box 255, Goose Bay, Labrador.

RABAUL AMATEUR RADIO CLUB

TERRITORY OF NEW GUINEA

VK9

This Certifies that Amateur Radio Stations

... W. and K. ...

Have Collectively met the Requirements of this Award

Has this day satisfied The Rabaul Amateur Radio Club that his Station has conducted two way communication with 5 Amateur Stations in the Territory of New Guinea, 5 in the Territory of Papua and one in one of the following Islands, Nauru, Christmas Island, Norfolk Island, Cocos Keeling Islands, since the First day of January, 1960.

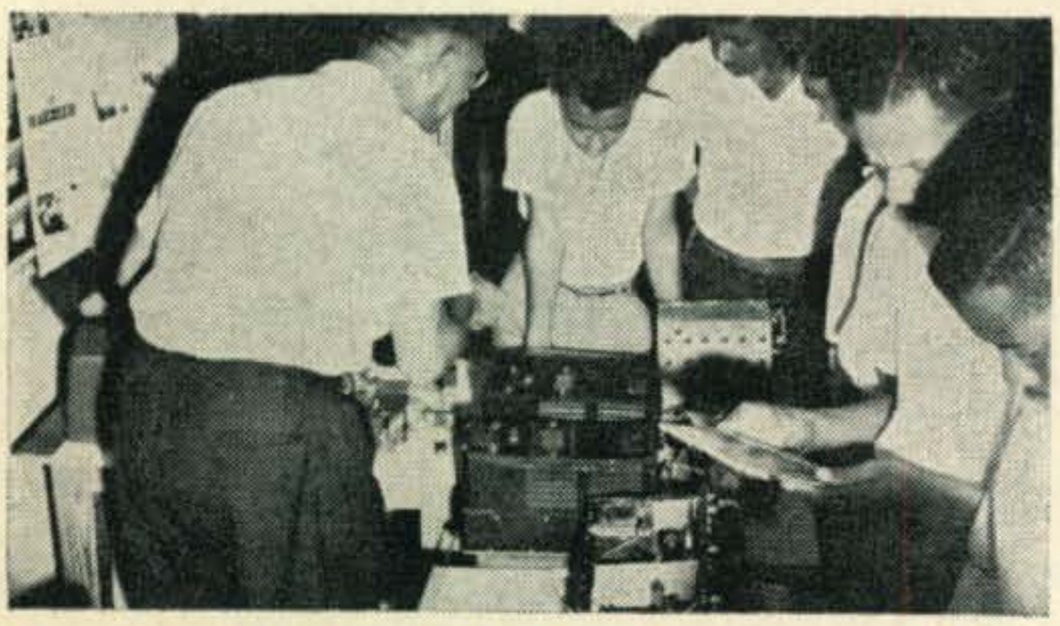
Certificate No. 1 Dated 21st March 1962

(President) (Secretary)

New wallpaper for working five VK9s. See text belo.. for details.

VK9 Certificate

This certificate is awarded by the Rabaul Amateur Radio Club, P.O. Box 170, Rabaul, Territory of New Guinea for proof of contacts with five VK9's located in the Territory of New Guinea, five VK9's located in the Territory of Papua and one in one of the following Islands: Nauru, Christmas Island, (VK9 not VR3) Norfolk Island, Cocos Keeling Islands. All QSOs must date after January 1st, 1960. A copy of the No. 1 certificate is shown which was awarded to all W and K amateurs who have collectively obtained the certificate.



Young Trinidadians flocked to the recent exhibition staged by the South Trinidad Amateur Radio Society recently. Some are shown here at the general information stand and display conducted by Doc, VP4PL. *(Tnx VP4NC).*

9U5MC Dies at 31

Jean P. Decoster, 9U5MC, who gave many 15 and 20 meter DXers a contact with rare Ruanda-Urundi last year, died in a Brussels hospital in late January, apparently a victim of Leukemia, according to a report from Ernie Welling, VE2YU.

Only 31 years old, Jean left Ruanda-Urundi last fall to return to Belgium for treatment and then came on to Montreal, during December. He returned to Brussels in mid-January and passed away a few days after his arrival. Jean was for quite some time the only operator on c.w. when Ruanda-Urundi became a separate country and he will be long remembered by his many friends.

QTHs and QSL Managers

AP5AH via AP5CP.
CE1GJ, Howard D. Springer, Casilla 469, Iquique, Chile.
EP2BQ Harry, Box B1065, Teheran, Iran.
FG7XH, Box 335, Pointe-a-Pitre, Guadaloupe.
FG7XL, Pierre, Box 109, Pointe-a-Pitre, Guadaloupe.
FW8BH via W4ANE, VK/ZL via VK3AHO.
HC5CN via K8TBR.
HC5RG via K8TBR.
HI3PC, Marco, Box 282, Santiago, Rep. of Dominica.
HI8DGC via W8UMR.
HI8JES via WA4AYX.
HKØAB via W4DQS.
HL9KN, Bill, Co. A., 51st Sig. Bn., APO 358, San Francisco, Calif.
HS2M, 4110 Gallatin St., Hyattsville, Md.
I1DFD c/o Post Signal Office, APO 221, N.Y., N.Y.
JZØHW via W6DLN.
KB6CA, Box 87, Canton Island, South Pacific.
KB6CL, Box 38, Canton Island, South Pacific.
KC6BD c/o Weather Bureau, Truk, Eastern Caroline Islands, South Pacific.
KP6AM via KH6AAJ, 617 Pamaele St., Kailua, Oahu, Hawaii.
KS4BF via W4DQS.
KS6AM via W1BYH.
KV4CI/AP5/4S7 via W2CTN.
M1QHP via DL4/DL5 QSL Bureau, c/o Base MARS, APO 130, N. Y. 17.
M1ZDP via W7ZDP.
MP4MAH, C. A. Thomas, Yibal, C/O P.D. (O) Ltd., MP4MA Muscat, via Bahrain, Arabian Gulf.
MP4TAC, Sgt. Alan Dicker, Trucial Oman Scouts, Sharjah BFPO 64, Trucial Oman, via London, England.
MP4TAM via MP4TAC.
TG6PB via WA4AYX.
TN8AM via W2CTN.
TN8AU, Box 41, Brazzaville, Congo.
TT8AL, Box 235, Fort Lamy, Tchad.
ex-VE8DM now VE7PU; Dick McQuillan, 104 Peveril Ave., Vancouver 10, B.C., Canada.
VK9LA, Box 5, Cocos Island, Indian Ocean or via VK6 Bureau.
VP2MC, W/VE via W4OPM, DX via G8KS.
VP2SM via WA4AYX.
VS5GS, G. Scott, S.O.A.S. College, Brunei Town, Brunei.
VP5MJ via KØTYO.
VS5PM, P.K.I. Mohamed, Telecoms Dept., Brunei Town, Brunei.
VP8EL, I. Francis, South Georgia, via Port Stanley, Falkland Is.
VQ9A, VQ9AA via W4ECI, E. C. Atkerson, 3101 Fourth Ave. S., Birmingham 5, Ala.
VS6AE via W6DIX.
W1TYQ, Vic Crawford, Box 1721, Aramco, Dhahran, Saudi Arabia.
W2CTN, Jack Cummings, 159 Ketcham Ave., Amityville, N.Y.
W4LCY/KM6 via W4LCY; Frank Phillips, RFD1, Box 33A, Baker, Fla.
W6QMN/KB6 via K6HAU.
WØANJ/KP6 via W4DKP.
WØMLY/Africa via KV4AA.
XE1CY, P.O.B. 325, Mexico City, Mexico.
XT2A via REF.
XW8AS, MAAG, Box 179, APO 152, San Francisco, Calif.
XZ2VK, P.O.B. 800, Rangoon, Burma.
ex-ZB1BW now G3PEU; Gerry Smillie, c/o Officers Mess, RAF Wyton, Hunts, Englann.
ZC5DO via VS1DO.
ZC5SF, G. Harrison, Box 232, Sandakar, British North Borneo.
ZD1S via K8MTI.
ZD6HK, Box 24, Blantyre, Nyasaland,
ZD6HK (after 20 May 62) via W2ELW.
ZD8JP c/o Cable & Wireless, Ascension Island, GMRD, Box 4187, Patrick AFB Fla.
ZS3EW via W2CTN.
ZS4BP/ZS9 via W8SMQ.
5A4TC via W2CTN,
5N2IND, Box 144, Lagos, Nigeria.
5N2RSB via K3MNJ.
5R8AG, Box 173, Diego Suarez, Madagascar.
6O1ND via W4KUA.
6W8DT, Box 3033, Dakar, Senegal.
9GIDE via K8IQQ.
9GIDN via VE4IM.
9GIDT via W4HUE.
9K2AQ via G3FJU.
9Q5AL, P.O.B. 427, Elizabethville, Congo.
9U5JF via VE3DGK (U.S. stamps OK).

NOW . . . PROOF OF DX PERFORMANCE

IS K6INI THE WORLD'S CHAMPION DX OPERATOR?

Judge for yourself! Read his letter and count the DX he has worked—with only 65 watts and a $16.95 Gotham V-80 Vertical Antenna.

2405 Bowditch, Berkeley 4, California
January 31, 1959

GOTHAM
1805 Purdy Avenue
Miami Beach 39, Florida
Gentlemen:

I just thought I would drop you a line and let you know how pleased I am with your V-80 vertical antenna. I have been using it for almost two years now, and am positively amazed at its performance with my QRP 65 watts input! Let me show you what I mean:

I have worked over 100 countries and have received very fine reports from many DX stations, including 599 reports from every continent except Europe (589)! I have also worked enough stations for my WAC, WAS, WAJAD and ADXC awards, and I am in the process of working for several other awards. And all this with your GOTHAM V-80 vertical antenna!

Frankly, I fail to see how anyone could ask for better performance with such low power, limited space and a limited budget. In my opinion, the V-80 beats them all in its class.

I am enclosing a list of DX countries I have worked to give you an idea of what I have been talking about.

Wishing you the best for 1959, I am
Sincerely yours,
Thomas G. Gabbert, K6INI (Ex-TI2TG)

V-80 VERTICAL ANTENNA FACTS

- If K6INI can do it, so can you
- Absolutely no guying needed.
- Radials not required.
- Uses one 52 ohm coax line.
- No relays, traps, or gadgets used.
- Special B & W loading coil
- Multi-band, V80 works 80, 40, 20, 15, 10, 6.

ANNOUNCEMENT!!

We proudly announce our appointment as franchised dealer in all leading TRANSMITTERS and RECEIVERS.

We feature a unique plan that absolutely guarantees proper installation and operation. ORDERS and INQUIRIES SOLICITED.

DO YOU KNOW

1. YOU WILL HAVE NO DIFFICULTY INSTALLING YOUR GOTHAM VERTICAL ANTENNA IN JUST A FEW MOMENTS, REGARDLESS OF YOUR PARTICULAR PROBLEM, SO ORDER WITH CONFIDENCE EVEN IF YOU HAVE RESTRICTED SPACE OR A DIFFICULT SITUATION.
2. LOADING COIL NOT REQUIRED ON 6, 10, 15 AND 20 METERS. FOR 40, 80, AND 160 METERS, LOADING COIL TAPS ARE CHANGED MANUALLY EXCEPT IF A WIDE-RANGE PI-NETWORK OUTPUT OR AN ANTENNA TUNER IS USED; IN THIS CASE BAND CHANGING CAN BE DONE FROM THE SHACK.
3. EVERY GOTHAM ANTENNA IS SOLD ON A TEN DAY TRIAL BASIS. IF YOU ARE NOT FULLY SATISFIED, YOU MAY RETURN THE ANTENNA PREPAID FOR FULL REFUND OF THE PURCHASE PRICE. THIS IS YOUR GUARANTEE OF FULL SATISFACTION.

FILL IN AND SEND TODAY!

Airmail Order Today — We Ship Tomorrow

GOTHAM Dept. CQ
1805-A PURDY AVE., MIAMI BEACH, FLA.

Enclosed find check or money-order for:

☐ V40 VERTICAL ANTENNA FOR 40, 20, 15, 10 AND 6 METER BANDS. ESPECIALLY SUITED FOR THE HAM WHO OPERATES 40 AND 15 ..... $14.95

☐ V80 VERTICAL ANTENNA FOR 80, 40, 20, 15, 10 AND 6 METER BANDS. MOST POPULAR OF THE VERTICALS. USED BY THOUSANDS OF NOVICES, TECHNICIANS, AND GENERAL LICENSE HAMS $16.95

☐ V160 VERTICAL ANTENNA FOR 160, 80, 40, 20, 15, 10 AND 6 METER BANDS. SAME AS THE OTHER VERTICAL ANTENNAS, EXCEPT THAT A LARGER LOADING COIL PERMITS OPERATION ON THE 160 METER BAND ALSO $18.95

HOW TO ORDER. Send check or money order directly to Gotham. Immediate shipment by Railway Express, charges collect. Foreign orders accepted.

Name_____

Address_____

City_____ Zone_____ State_____

For further information, check number 21, on page 126

Sideband [*from page 73*]

band suppressed carrier with maximum 3000 cycle bandwidth.'" Anyone else for giving Kermit some backing? . . . Hart, W8VVD, adds an important point to our suggestion that you send U.S. coins to defray QSL expenses by noting that Section 221.3 of US Postal Manual states: "The following articles are prohibited transmission in the postal union mail to all countries . . . coins, bank notes, paper money or any other values payable to bearer. . . . *unless sent by registered mail.*" Many thanks for clarifying this matter, Hart!

Mary, W9RUJ, continues to show progress against the disabling effects of her stroke and hope runs high that we shall one day have her back on the air with us again. Len, K9HBH, and Joe, W9PYM, serviced her equipment and it's all set for her to throw the switch. Len, and Mary's OM, Henry, assembled all the material for the "Grandmother's Certificate" for which Mary had been Custodian and sent it to Anita, K9HCY, Streater, Illinois, who will now handle the certificates. . . . A unique guest book "hangs" in the photo shop of Larry, K9LKA, in Belvidere, Illinois. It's a lamp shade which is rapidly being covered by the signatures of visitors who came from far and near to meet Larry. . . . Felton, KØZZR, is one of those perenially young people whom it is always an inspiration to meet. The grandfather of eleven active youngsters, Felton is as active and enthusiastic about his sideband activities as a newly-licensed teenager. . . . Time marches on—now we have WB stations being licensed in the 2nd District; our first contact with this new prefix being with Arist, WB2ADI, of Brooklyn, New York whom we met while in QSO with *CQ's* DX Editor, Urb, W2DEC.

We had a delightfully unexpected hamfest at our home in early June when we played host to Joe, EI8P; Bill, KP4DP, and his brother, Bob; Dottie, WA2RPN, and Lee, WA2RPC; and Mary WA6HKJ, and Claude, W4??? (sorry, Claude, just can't think of your call on this hot day)! It was Joe's introduction to a Barbecue—East Coast American style—and since there seemed to be no unseemly after-effects, we trust that he enjoyed it. . . . We are looking forward to a summer crowded with visits from many sidebanders; We hope that Summer, 1962, will be an enjoyable one for you also.

73, Irv and Dorothy

Space [*from page 75*]

more detailed information concerning OSCAR II reception reports. Remember this is your satellite and your project. It will prove its worth only if you have listened to it, and send in your observation. All reports, no matter how simple or sophisticated, will be of great assistance to this radio amateur space experiment.

Next month's column will contain a detailed report on the results of the OSCAR I experiment, as well as a preliminary look at the OSCAR II results. The column will also discuss a possible OSCAR III experiment.

73, George, W3ASK

KW R.F. Transistor [*from page 65*]

frequency! They are water cooled "big brother" versions of the PT-900.

Although not quite as exotic as the PT-900, PSI personnel are justly proud of their latest contribution to the semiconductor art. Their 2N1709 is a triple diffused NPN mesa, about the size of a quarter. The 2N1709 is rated at 5 watts output at 70 mc. However, amateurs in the developmental lab have constructed experimental transmitters which generate 10 to 12 watts at 30 mc. Again, the 2N1709's are made on pilot production lines and their cost is rather high at the moment. The people at PSI expect that the price will be down to $15.00 within a few years.

January 1961 was a turning point for medium power r.f. transistors. Citizens and equipment manufacturers, who are involved in a keenly competitive business, discovered PSI, and PSI was ready for them with "gradeouts" of their regular military and industrial types. By the time you read this, several companies will have announced their 5 watt completely transistorized Citizens Band transceivers. Amateurs will immediately realize that these same transistors can be used in ham gear between 3 and 30 mc. Although it will be some time before we can afford the kilowatt r.f. transistors, I predict that some progressive manufacturer will introduce a 5 watt transistorized exciter or transceiver to be used in conjunction with instant heating 6146's.

The Triple Diffused Mesa transistor has overcome the difficulties and deficiencies of other "garden variety" devices. In theory its maximum power rating is unlimited and the device will operate well into the hundreds of megacycles. Amateurs will soon be home-brewing rigs around these devices for they represent the most "watts-per-dollar" transistors on the market today. ■

Propagation [*from page 77*]

Samoa & Pacific Islands	16-19 (1)* 09-11 (1) 11-15 (2) 15-19 (3) 19-20 (2) 20-21 (1)	07-08 (1) 08-11 (2) 11-18 (1) 18-20 (2) 20-22 (4) 22-00 (3) 00-02 (2) 02-04 (1)	21-22 (1) 22-05 (3) 05-07 (2) 07-08 (1)	22-01 (1) 01-04 (2) 04-06 (1) 02-06 (1)†
New Zealand	11-13 (1)* 13-15 (2)* 15-19 (1)* 09-10 (1) 10-12 (2) 12-15 (1) 15-17 (2) 17-19 (3) 19-21 (2) 21-23 (1)	17-19 (1) 19-21 (2) 21-00 (4) 00-02 (3) 02-04 (2) 04-07 (1) 07-09 (2) 09-12 (1)	22-23 (1) 23-01 (2) 01-05 (3) 05-07 (2) 07-08 (1)	00-02 (1) 02-05 (2) 05-07 (1) 02-06 (1)†
Australia	14-19 (1)* 12-16 (1) 16-20 (2) 20-22 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-02 (2) 02-07 (1) 07-09 (2) 09-13 (1)	01-02 (1) 02-03 (2) 03-05 (3) 05-07 (2) 07-08 (1)	02-03 (1) 03-05 (2) 05-06 (1) 03-05 (1)†
South America	08-12 (1)* 12-15 (2)* 15-17 (1)* 05-06 (1) 06-08 (3) 08-12 (2) 12-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-21 (1)	14-16 (2) 16-18 (3) 18-20 (4) 20-00 (3) 00-02 (2) 02-06 (1) 06-08 (2) 08-14 (1)	19-21 (1) 21-00 (3) 00-02 (2) 02-05 (1)	21-23 (1) 23-01 (2) 01-03 (1) 23-01 (1)†
McMurdo Sound, Antarctica	12-17 (1)* 11-16 (1) 16-19 (2) 19-21 (1)	07-09 (1) 16-18 (1) 18-20 (2) 20-22 (3) 22-23 (2) 23-00 (1)	00-07 (1)	*Nil*

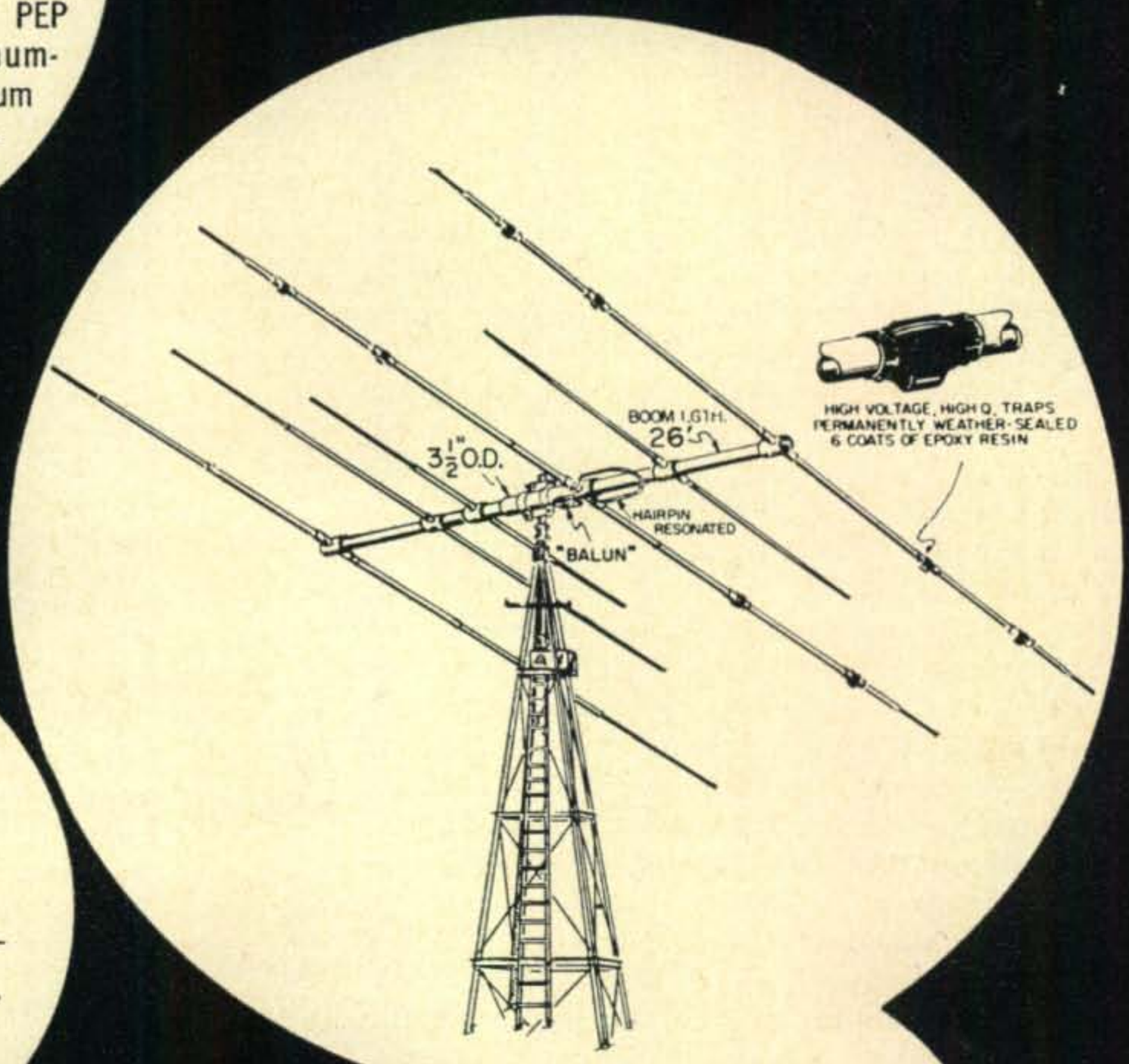
NOW AT HARVEY!

King of the Tri-Bands:® Rugged Hi-power MONARCH

by **Telrex**

for 10, 15, and 20 Meters

Here's truly the King of all Single-Transmission-Line Tri-Bands! . . . the new Telrex MONARCH Model TM-30C. Engineered for high reliability and high performance, it has all-aluminum ruggedized construction. Incorporates 6 optimum-spaced (trapped) elements that are precision tuned and matched . . . plus Telrex's famous Broad-Band "Balun." 4 KW PEP rain or shine. Separate optimum-spaced reflectors provide optimum gain and F/B ratio without degrading gain, impedance, or bandwidth.



LOOK AT THESE OUTSTANDING SPECS

TEN WORKING ELEMENTS:

4 elements on 10 M. gain 10 DB, F/B 24 DB
3 elements on 15 M. gain 10 DB, F/B 24 DB
3 elements on 20 M. gain 10 DB, F/B 24 DB

Wind surface area, 9.50 sq. ft.
Wind load at 100 M.P.H., 300 lbs.
Longest element length, 36 ft.
Turning radius, approx. 24 ft.
Net weight, approx. 89 lbs.
Shipping weight, approx. 98 lbs.

Complete with Telrex Broad-Band "Balun"

$378.00

PROMPT DEPENDABLE SERVICE TO ANY PART OF THE WORLD

hrc **HARVEY** ESTABLISHED 1927 **RADIO CO., INC.**

103 West 43rd Street, New York 36, N. Y./JUdson 2-1500

For further information, check number 22, on page 126

UHF [*from page 81*]

interfering station, which originated in Kansas, wiped out the local. The interfering station was arriving off the back of the beam! Six meters was swinging 'til well after midnight.

Is anybody in Southern California in the market for one of the best v.h.f. locations in this part of the state? It's located at Running Springs about 6400' elevation and has a line of sight view in all directions. The property includes water and electricity and a 860 sq. ft. three bedroom house on a year-round road. Drop me a line if this tickles your fancy (what, you don't have a fancy?).

With that, back to the six meter project.

73, de Don, W6TNS

One Knob Madness [*from page 46*]

one day it developed a peculiar fault which I never cured. The v.f.o. would fly off a kc or so and wobble for a minute, then it would come back again and stay OK for ten. In the end, in desperation I gave the whole thing away to an undeserving friend.

So now I have a *completely* commercial rig. (Even the power pack's commercial.) It has a few switches scattered around its pristine panel —just enough to satisfy me. Going over is quite a long procedure because I haven't taken advantage of the maker's facilities on the back apron. But I don't want to uncomplicate life that way so I'll stick to the old routine of flick that up, turn that down, jab them, thumb this and send.

The trouble is, tonight I had a visit from rare DX man Charlie Marks ZD2CM and he asked me if he could use my rig to QSO his QSL manager W8KVQ. I said OK—come along into the shack. As the knobs were manipulated, the mighty 25 watter hummed into life. Several quick flicks of the wrist brought twenty whanging in. I wagged the ancient bug in a few exploratory V's and the pilot lamp on the TX winked in sympathy.—WINKED IN SYMPATHY!!! It shouldn't do that! I tried the switch marked v.f.o. beat/transmit. On transmit it switched the rig off altogether. I tried the one marked c.w./fone. On c.w.—you guessed it—it took modulation!

So now I'm up to my ears in the bits and thinking hard. All you folks who have been waiting for something new in the way of control circuits haven't much longer to hang about. Forget all your complicated wafer switches and vox. Forget those chattering relays and involved cat's cradle line drawings. With my new system you will have the *ne plus ultra* in reliability and simplicity. In fact simplicity is the only word that describes adequately this magnificent concept. My new rig will have *no switches at all*—the operator will just plug in the line cord when he wants to transmit. And pull it out when he wants to receive. ■

USA-CA [*from page 90*]

Unfortunately, we find it difficult to bring you much of what otherwise would be highly interesting awards data simply because many awards sponsors are utterly lacking in foresight and knowhow about publicity matters. We would suggest that all amateur organizations elect or assign a 'qualified' Public Relations Officer who has some basic knowledge of such matters and who is inclined to promote the organization's and hamdom's welfare. In many instances, a club's PR Officer could be the most important club billet. Too often we get meager information from a club's secretary asking for publicity on this or that award and in checking our files find the club has never had the foresight to send a sample copy of the award they want publicized. We might add, whether local, national or international, a lack of responsible PR can make or break a club and/or relegate it to a second or third-rate organization. We want to help all hamdom organizations get merited publicity; however, we can't help those that haven't the capacity to help themselves.

So folks, help the OLD MAN help you and provide a service to others . . . send in more complete materials and pictures . . . be assured, *if* it is high interest news, we'll fight that New York Editor swab for all possible space in what he calls a technical rag. With your help we'll yet convince him you good folks like a bit of the 'unusual' and news mixed with the Do-It-Yourself Kits.

Thanks for all the letters . . . keep 'em coming. Happy Vacation and Happy Hunting,

The OLD MAN, K6BX

Two-Signal [*from page 61*]

the 80 db bandpass in the presence of an interfering signal is actually almost 80 kc, rather than 24 kc as indicated by the single-signal selectivity curve.

This example clearly illustrates the fact that the selectivity at the i.f. stages cannot be linearly transferred to the antenna. Thus the full selecivity inherent in the mechanical filter can never be actually realized.

Measurement Techniques

Perhaps by now you are beginning to wonder about the two-signal selectivity of your own receiver. The equipment layout in fig. 4 may be used to measure the two-signal selectivity of a receiver.

The 6 db T-pad serves to isolate the outputs of the two signal generators. If it were not used, there is a possibility that the output of one of the generators could enter the other generator and cause intermodulation distortion in the generator itself. This would cause inaccuracies in the results.

The distortion analyzer is used to measure the signal-to-noise ratio as follows. The analyzer should be connected across the audio load of the receiver, with the function switch of the analyzer in the LEVEL SET position, and adjusted to any convenient full scale reading of the meter on the analyzer. The analyzer should

LAFAYETTE RADIO

FOR BIGGER VALUE—PROGRESSIVE DESIGN

MADE IN USA

COMPARE QUALITY!
COMPARE PRICE!

82.75
NO MONEY DOWN

Announcing

the NEW STARFLITE T.M.
90 WATT PHONE and CW TRANSMITTER KIT

• 90 Watts Phone or CW on 80 Thru 10 Meters • Built-in 3-Section Low-Pass Filter • Clear, Chirpless Grid Block Keying

Dollar for dollar you can't beat this new Lafayette **Starflite** transmitter. Easy to build and operate, it glistens with quality and performance all-over. Features in addition to those listed above: 5 crystal positions and provisions for external VFO, illuminated edgewise panel meter and pin-net work output for proper antenna match. Buy one now — we know you'll be satisfied with it.

KT-390 ..... Net **82.75**

THE LAFAYETTE HE-30

Professional Quality Communications Receiver

99.95

TOP VALUE COMMUNICATIONS RECEIVER

KT-200
in Kit Form
64.50

HE-10
79.95
WIRED AND TESTED

NO MONEY DOWN

- **TUNES 550 KCS TO 30 MCS IN FOUR BANDS**
- **BUILT-IN Q-MULTIPLIER FOR CROWDED PHONE OPERATION**
- **CALIBRATED ELECTRICAL BANDSPREAD ON AMATEUR BANDS 80 THRU 10 METERS • STABLE OSCILLATOR AND BFO FOR CLEAR CW AND SSB RECEPTION • BUILT-IN EDGEWISE S-METER**

Sensitivity is 1.0 microvolt for 10 db, Signal to Noise ratio. Selectivity is ± 0.8 KCS at —6db with Q-MULTIPLIER. TUBES: 6BA6—RF Amp, 6BE6 Mixer, 6BE6 OSC., 6AV6 Q-Multiplier—BFO, 2-6BA6 IF Amp., 6AV6 Det-AF Amp. ANL, 6AQ5-Audio output, 5Y3 Rectifier.

• SUPERHET CIRCUIT UTILIZING 8 TUBES AND RECTIFIER TUBE • BUILT-IN "S" METER WITH ADJUSTMENT CONTROL • FULL COVERAGE 80-10 METERS • COVERS 455KC TO 31 MC • VARIABLE BFO AND RF GAIN CONTROLS • SWITCHABLE AVC AND AUTOMATIC NOISE LIMITER

The Communications Receiver that meets every amateur need—available in easy-to-assemble kit form. Signal to noise ratio is 10 db at 3.5 MC with 1.25 microvolt signal. Selectivity is —60 db at 10 kc, image reflection is —40 db at 3 MC. Tubes: 3—6BD6, 2—6BE6, 2—6AV6, 1—6AR5, 1—5Y3.

NEW! LAFAYETTE HE-45A DELUXE 6-METER TRANSCEIVER

- **Highly Sensitive Superheterodyne Receiver Section for 50-54 Mc**
- **Effective Series Gate Noise Limiter**
- **3-Stage, 12-Watt Transmitter with 2E26 Final**
- **Illuminated Panel Meter for Plate Current and "S" Readings**
- **Pi-Network Transmitter Output**
- **Built-in 117 VAC and 12 VDC Power Supplies**
- **Push-To-Talk Ceramic Microphone**

Provides maximum convenience and flexibility in either mobile or fixed operation.

LAFAYETTE HE-50 10-METER TRANSCEIVER
Similar to above except for 10 meter operation **109.50**

Made in U.S.A.

114.95
NO MONEY DOWN

FREE!
SEND FOR LAFAYETTE'S SUMMER CATALOG SUPPLEMENT

LAFAYETTE RADIO, DEPT. CH-2
P.O. BOX 10
SYOSSET, L. I., N. Y.

☐ Send FREE 1962 SUMMER Catalog Supplement featuring the full line of Lafayette Amateur Equipment.
.....enclosed for Stock No. .....

Name.....

Address.....

City..... **Zone** ..... **State**.....

For further information, check number 23, on page 126

then be switched to the DISTORTION position, and adjusted for a null. The distortion and noise are now indicated on the analyzer meter. For the purposes of this article, the distortion may be classed as noise, so that the signal-to-noise ratio, then is simply the number of db difference between the two meter readings. There are other means of measuring the signal-to-noise ratio, and these may be used if a distortion analyzer is not available.

Set the "on channel" signal generator to the receiver tuned frequency, amplitude modulated 30 per cent at 1000 c.p.s.; then adjust the signal level to obtain a 12 db signal-to-noise ratio. (A 12 db s/n ratio is generally accepted as the minimum necessary to carry on communications with voice signals.) Then set the "interfering" signal generator up for amplitude modulated output, modulated 30 per cent at 400 c.p.s. Set the frequency of the interfering generator on channel, and adjust its signal level to reduce the s/n ratio by 6 db. Then move the interfering signal in fixed increments away from the on-channel frequency. At each frequency, record the level of the interfering signal required to cause a 6 db degradation in s/n ratio. When the measurements are completed, the results should be plotted on a graph showing the ratio of interfering signal to on-channel signal (in db), versus frequency. Then, for a real eye-opener, plot the measured single-signal selectivity curve as well, and compare the two. This will show you that the single-signal selectivity curve, as published by equipment manufacturers, just doesn't tell you how your receiver will perform in the presence of interference.

There are many cases in today's h.f. amateur communications that will result in as great as a 100 db dynamic range of signal inputs at the antenna terminals of your receiver. The most obvious of these is the case of a neighboring amateur. If you have ever lived near another amateur, you probably have noticed that when he came on the air, even on a different band, your receiver sensitivity was degraded. But this is not the only case. When chasing DX on the low end of the 80 meter c.w. band (or any other band), you very often have DX signals at less than one microvolt. Some of our kw-and-rotary-beam U.S. brethren are producing signals in the order of hundreds of *millivolts* at your antenna terminals. No wonder even the best receivers start snorting and grunting around in a situation like that.

If you are interested in further reading on two-signal selectivity considerations, a few good references on the subject are listed below. In addition to these, consult the nearest engineering library for back issues of the *IRE Transactions* on Vehicular Communications. While you're at it, you may pick up some good ideas for receiver design. ■

Manke, "Effect of Front End Receiver Design on Overall Performance," *IRE Transactions on Vehicular Communications*, PGVC-5, June 1955.

Shepherd, "Bi-Dimensional Interference Analysis," *Proceedings of the Third Conference on Radio Frequency Interference Reduction*, Armour Research Foundation, 1957.

Marcus, "Good Design Practices for Reducing Interference Producing Properties of Receivers and Transmitters," *Proceedings of the Sixth Conference on Radio Frequency Interference Reduction*, Armour Research Foundation, 1960.

Marcus and Taylor, "Determining True Receiver Performance," *Electronic Industries*, February 1962, p 120.

32S-1 Improvements [*from page 51*]

certain to use a top quality capacitor for C_{12} if it is replaced since its stability is critical to the capacitative balance of the diode quad. In addition, C_{13}, C_{122}, C_{139} and C_{10} may be replaced for increased stability by either Corning type CY capacitors which are expensive but good, or El Menco Duramica type DM15 which are very effective and lower in cost. The results are greatly improved stability in maintaining balance and greater dynamic range than with the 1N34As.

Linearity—The linearity and power capability of the 6146's, while within specifications, is greatly dependent upon the regulation of the control and screen grid supply voltages. The regulation of the 6146 screen supply may be improved by reducing the value of R_{113} or removing R_{113} and R_{114} from pin 3 of the 6146's and connecting the +275 v. directly. An 8AG 1/16 ampere instrument type fuse may be inserted in the screen lead to protect the tubes in case of h.v. power failure. Screen current to the p.a. in the CW mode is still only 12 ma, or 1.65 watts per tube, under maximum power conditions after this change (with the full +275 v on the screens). The supply regulation improves from 7% to 3%, the basic capability of the low voltage power supply.

Automatic Load Control—A simple refinement in the a.l.c. circuitry is the regulation of the screen voltage of V_6, the r.f. amplifier, to provide improved a.l.c. attack time. The reason for this is that as a.l.c. voltage is biasing off this stage, the screen voltage soars, tending to counteract the a.l.c. effect. A 100K ½ watt resistor is paralleled with R_{38} and a 100K 1 watt resistor is placed from pin 6 of V_6 to ground. Also, for those who wish to eliminate a.l.c. on c.w., S_{8G} should be jumpered to the c.w. terminal from the tune and lock key terminal; the lead between C_{83} and C_{142} should be removed and replaced on pin 7 of V_{13} as shown in fig. 10. Without this change it is impossible to eliminate the a.l.c. on c.w. To verify this, watch the power output rise with the key down.

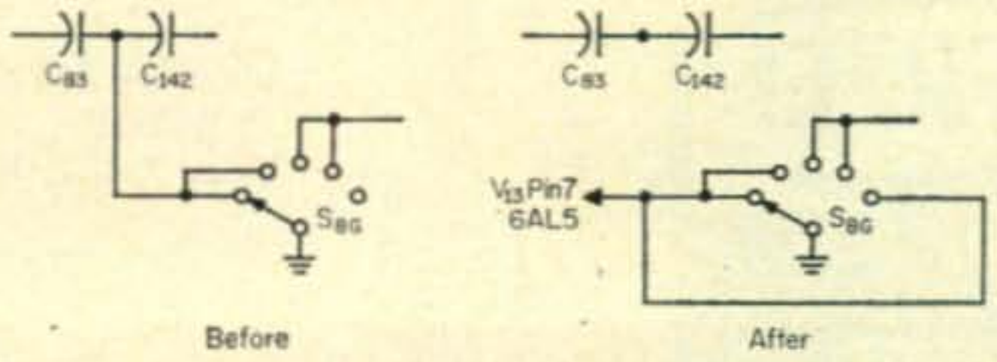


Fig. 10—Circuit modifications necessary to eliminate a.l.c. action in the c.w. mode.

Terry (W9DIA) Guarantees You a FANTASTIC TRADE on Collins 75S-3 Receiver

Collins' 75S-3, the latest addition to the famous S/Line of amateur equipment, is a versatile receiver with the sharpest selectivity available to you in any of three models—SSB, CW and RTTY. AM reception is also provided, and an additional Mechanical Filter may be installed for improved skirt selectivity.

Price $680.00—$5 Down—$24.35 per month.

Get My Quote Today— You'll Be Glad You Did!

$5 DOWN! Take 1-2-3 Years To Pay!

	Ham Price New	Per Mon'th
30 L-1 Linear Amplifier	$ 520.00	$18.59
30 S-1 Linear Amplifier	1556.00	56.00
32S-3 Transmitter	750.00	26.90
75S-3 Receiver	680.00	24.35
51J-4 Receiver	1464.00	52.69
51S-1 Receiver	1828.00	65.83
KWM-2 Transceiver	1150.00	41.35
DL-1 Dummy Load	58.00	1.91
351D-2 Mobile Mount (KWM-2)	120.00	4.15
CC-2 Carrying Case	85.00	2.88
MP-1 15 V DC Power Supply	198.00	7.10
PM-2 Portable Power Supply	150.00	5.24
516F-2 AC Power Supply (32S/KWM-2)	115.00	3.97
321B-3 Speaker (S-Line)	32.00	.97
312B-4 Speaker Console (S-Line, KWM-2)	195.00	7.00
312B-5 PTO Console (KWM-2)	350.00	12.45
399C-1 PTO Speaker	164.00	5.75
F455Q-5 Mechanical Filter (75S)	52.00	1.70
302C-3 Directional Wattmeter	130.00	4.51
189A-2 Phone Patch	67.00	2.10
440E-1 Cable (516E-1 to KWM-2)	17.00	.43
136B-2 Noise Blanker (KWM-2)	124.00	4.30

Above are shown for a 3 year contract. Minimum order that can be financed for one year is $60, two years $120, three years $180. Persons signing time pay contracts must be 21 or over and employed. Will finance for service man OVERSEAS!

Get our trade offer before you buy!

BRAND NEW—and Terry Has It!

Collins 32S-3

SSB XMITTER LIMITED STOCK

$750 Ham Net **$5 Down—$26.90 per Month**

Bargains in Collins Reconditioned Gear

75A1 Receiver	$229	30S1 Linear amplifier	995
75A2 Receiver	279	516E1 DC Supply for KWM-1/KWM-2	149
75A3 Receiver	379	75S1 Receivers	349
75A4 Ser. #0-1500	495	75S1/500 cycle filter	399
75A4 Ser. #1500-3000	525	75S1/500 cycle filter/q Multiplier	419
75A4 Ser. #3001-4500	550	KWM-2 Transceiver	85[illegible]
75A4 Ser. #4501-6000	595	KWM-2 Noise Blanker	895
32V1 Transmitter	179	351D2 Mobile Mount for KWM-2	69
32V2 Transmitter	219	F455J60 75A4 Filter	34
KWS-1 Ser. #9239	850 to 900	353C31 75A1 Filter	29
KWM-1 Speaker Console	89	800 Cycle Filter 75B4	39
S16F1 AC Supply for KWM-1	69		
351D1 Mobile Mount for KWM1	29		
136A1 Noise blanker	49		

WRITE FOR LATEST LISTING: 10% DOWN!

Up to one year to pay on $60 order, two years to pay on $120 order, three years on $180 sale. $5 deposit holds your selection. Financing is available to servicemen. Will pack for APO Shipment.

TRADES ACCEPTED ON ALL NEW OR RECONDITIONED GEAR — USE COUPON.

Stay on the Air Plan

Why go off the air? Deal with Terry and you use your Trade In until your new gear arrives.

AMATEUR ELECTRONIC SUPPLY

Two Stores to Serve You

PLEASE SEND MAIL ORDERS TO MILWAUKEE STORE

MANAGER, STEVE, W9EAN

MILWAUKEE, WISCONSIN
3832 Lisbon Avenue
Phone: WEst 3-3262

MANAGER, "DOC", W9HJS

CHICAGO, ILLINOIS
6450 Milwaukee Avenue
Phone: ROdney 3-1030

Amateur Electronic Supply—Mail Order Dept. C-86
3832 W. Lisbon Ave., Milwaukee 8, Wisc.

Ship me .....

I enclose .....: I will pay the balance in

☐ 1 year ☐ 2 years ☐ 3 years

I want to buy ..... and want to trade

..... What's your deal?

Name .....

Address .....

City .....State.....

☐ Send reconditioned equipment bulletin

For further information, check number 24, on page 126

Another refinement is the addition of high speed silicon (switching) diodes to replace V_{13} and V_{10}. These save power and reduce heat. These are not too critical but they must have very high back resistance and p.i.v.'s of 10 volts or more. Hughes type 1N625 silicon diodes were used. For simplicity, they may be mounted on 7 pin Vector plug-in sockets.

Miscellaneous

A refinement for the −70 volt supply is the use of a VR90 or Zener regulator. This is desirable since the bias will then hold steady for different line voltages as well as for the drain caused by small values of grid current on peaks.

Tube life can be markedly improved through the use of IERC tube shields in place of the existing ones. This is particularly true of the 6CL6 in the p.a. shield box as well as the 6U8's which have a high failure rate due to excessive bulb temperature. These shields reduce the envelope temperature, resulting in longer life for the tubes. The shields recommended are the IERC TR series. A 6EA8 may be substituted for the 6U8 for an improvement in life span.

For those who wish to maintain the same frequency calibration between the c.w. and fone portions of a band, the frequency of the high frequency crystal oscillator may be shifted. This results in the v.f.o. dial reading the suppressed carrier frequency for s.s.b. operation and the actual operating frequency for c.w. This may be accomplished by padding the appropriate crystal with a small parallel capacitor. Either the phone band or c.w. band crystal or both may have to be padded. It is required that a high stability (air, ceramic NPO, or glass) capacitor be employed. This should be done following the linearity adjustment of the v.f.o. for precise calibration as outlined in the handbook for the unit.

We wish to gratefully acknowledge the assistance rendered us by Leigh Karaki, W6SUD, who guided us in the selection of high stability components. ■

Calendar [*from page 71*]

S A C

C.W.

Starts: 1500 GMT Saturday, September 15th.
Ends: 1800 GMT Sunday, September 16th.

Phone

Starts: 1500 GMT Saturday, September 22nd.
Ends: 1800 GMT Sunday, September 23rd.

This is the fourth Scandinavian Activity Contest and this year it is being sponsored by the Experimenting Danish Radioamateurs.

Its the world working the Scandinavians in this one. For contest purposes the following prefixes will be considered: LA, LA/p, OH, OHØ, OX, OY, OZ and SM/SL; eight in all.

1. Two classifications, single and multi-operator. Club stations will be considered as multi-operator even though only operated by one man.
2. Use all bands, 3.5 thru 28 mc.
3. The usual five and six digit serial number, signal report plus a three figure progressive contact number starting with 001.
4. Each contact counts one point.
5. A multiplier of one for each prefix worked on each band, a maximum of eight per-band.
6. The final score will be the total QSO points multiplied by the sum of the multiplier from all bands.

Certificates will be awarded to the two highest scoring stations in both classes, c.w. and phone, in each country and each W/K call area. The Contest Committee may issue additional awards, depending on the returns.

Logs should show in this order—Date/Time in GMT, Station worked, numbers received and sent, band and note each new multiplier. A separate sheet for each band is not necessary, however a summary sheet showing the scores for each band is requested.

The summary sheet should also include other essential information regarding equipment and any comments. Don't forget the usual signed declaration that all rules have been observed. And last but most important, your name and full address in BLOCK LETTERS.

Mailing deadline is October 15th. This year your logs go to the EDR Traffic Department, P.O. Box 335, Aalborg, Denmark.

VK/ZL DX

Phone

Starts: 1000 GMT Saturday, October 6th.
Ends: 1000 GMT Sunday, October 7th.

C.W.

Starts: 1000 GMT Saturday, October 13th.
Ends: 1000 GMT Sunday, October 14th.

This year's VK/ZL DX Contest has been expanded with a few major changes in the rules and awards to make the contest wider in scope and more interesting for all.

Basic changes are: 1) Overseas stations may now QSO stations in any Oceania country as well as VK/ZL stations. 2) Besides the usual awards which were based on all band operation, certificates will now also be awarded to top scorers on individual bands. Full details next month.

CQ WW DX

Phone

Starts: 0000 GMT Saturday, October 27th.
Ends: 2400 GMT Sunday, October 28th.

C.W.

Starts 0000 GMT Saturday, November 24th.
Ends: 2400 GMT Sunday, November 25th.

The following are a few major changes incorporated this year.

1. Contest period has been *advanced* 2

USA-CA

RECORD BOOK

NOW AVAILABLE

CONTAINING:

- COUNTY Outline Maps of All 50 States
- RULES, Regulations, Certification Forms
- ALPHABETICAL List of Counties By State.
- CROSS-Indexed Maps.

- 108 pages, 8½ × 11".

Price – $1.25, Postpaid

Obtain Your Copy *Now* From:

CQ – 300 W. 43rd St.

New York 36, N. Y.

Complete Rules Appear on Page 84 of The March Issue.

USA-CA
CUSTODIAN

Clif Evans, K6BX
Box 385, Bonita
California

FL-8
FL-5F
FILTERS

These extremely selective audio filters have six tuned circuits and can be used either to peak a signal of 1020 cycles or reject it. The filter is very simple to use. Just connect it in the headphone line, or at the input to your last audio stage . . . that's all there is to it.

They are an outstanding success for CW operations as one of the greatest single-signal circuits ever devised. When you switch to "peak" all you hear are 1020 cycle signals, with everything else filtered out. On phone you switch to "null" and take out heterodynes. One filter gives you better than .' kc (to 60 db down) selectivity. If you are interested in seeing what 2 or more will do, check Nov. 1957 CQ, pg. 60, showing how 4 are used for a selectivity of 150 cycles at 50 db down! You can also read all about the filter in the March 1962 issue of 73 in the W4THU article: "Cure That Angry Band."

Filters normally sell for about $5 each, when you can find them. The FL-8 has a switch built in, and the FL-5 requires an external switch to change from peak to null to out. The FL-5 is ideal for building into gear, while the FL-8 is handier to use outboard. Just try one of these filters and see what a difference it makes!

Included *free* with your order is booklet with suggestions for most effective use of filters, complete with detailed schematics!

POSTPAID $2.49 ea.

ORDER YOURS TODAY!

Please send me .... FL-8 Filters at $2.49 ea.

..... FL5F Filters at $2.49 ea.

Name .....

Address .....

City ..... Zone ... State .....

SEG SALES

1306 Bond Street, Los Angeles 15, Calif.

Enclose check or money order.
Calif. residents include 4% sales tax
Include 25¢ Postage Per Unit

For further information, check number 26, on page 126

hours. This will make it a little less difficult for the thousands of Europeans that participate in our contest. However it's still a 48 hour contest!

2. The minimum operating time required for an award has been *reduced* to 8 hours on the *two* high-frequency bands, 21 and 28 mc. The 12 hour minimum however still holds for all other operations.

3. Trophy winners will again be elegible to compete for the same trophy after a 3-year period. In the past a trophy could only be awarded once to the same station.

4. And finally, an *increase* in QSO point value for contacts between stations in North America. The usual 1 point for contacts between stations on the same continent will now be increased to 2 points for QSOs between North American stations. This change is being made in an effort to stimulate some activity in *Central America* and the *Caribbean*, an area that has been very disappointing in the past.

Before you start yelling "foul" stop and analyze the situation! Geographically some of these stations are in the same area as the northern section of South America. Still their W/K contacts have been limited to 1 point. Not to mention the very difficult problem of breaking through to other areas to build up a multiplier.

This equalizer is being made for the benefit of all North American stations except the USA. The W/Ks have very little to gain because of the limited number of stations in these areas. Take a look at the contest returns. The advantage is all in favor of the other North American countries.

If we can improve the activity in the Caribbean and Central America, everybody will profit by the additional country multipliers that will be made available. Let's give it a try. Full details next month.

Ed Note

Our old friend Uda Ross, OA4J just advised us that the dates of the PERUANANO contest are correct as listed. It is assumed the rules are the same as in the past. See August, 1961 *CQ*, page 74 for details. Still no word from LABRE.

You will note that the RSGB has slipped in a new one. That 7 mc phone contest on the same date as our Phone week-end should be interesting.

The printer got a bit confused in the listing of the scores on page 104 of the June issue. All the stations listed under Poland, Roumania, Sweden, Vatican City, Yugoslavia and the U.S.S.R. should have been listed as *Single Transmitter*. The Multi-Transmitter group ends with G3OHM. Also, a correction in the "Runner Up" listing in the c.w. scores. The 3.5 mc USA runner up should have been W6BYB with a score of 6253 instead of W1BU. This was my error, sorry!

That should do it for this month.

73 for now, Frank, W1WY

See Terry (W9DIA) for Your Best Deal on

C L E G G !

Big Inventory Sale! TERRIFIC TRADES!

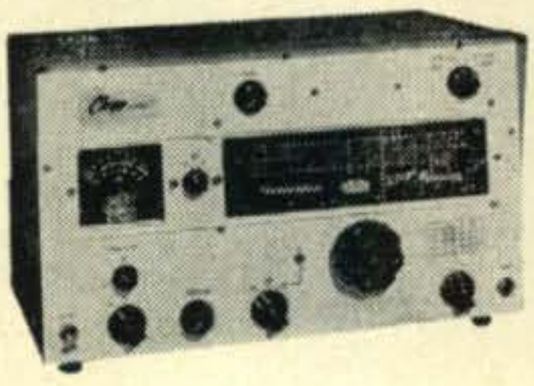
$5.00 DOWN ...UP TO 3 YEARS TO PAY

I'm Mad!

This darn Clegg Zeus works better than my home brew KW on 6 meters.

VIC W9JFP
Milwaukee, Wisc.

NOW IN STOCK NEW CLEGG INTERCEPTOR RECEIVER



Amateur Net
$473.00

My Amazing Guarantee

To show you what **Vic** means, I am offering you a guarantee of complete satisfaction on the new **Clegg** Product. If you are not satisfied within 30 days with any **Clegg** Product you order from me, I'll allow full credit towards the purchase of any other new V.H.F. equipment of equal or greater value.

Stay On The Air Plan

Use Your Trade In 'Til you have your New **Clegg** Equipment in your shack operating. Then ship me your trade in. No need to go off the air.

LOOK AT THESE E-Z MONTHLY PAYMENTS

Take up to 3 years to pay!

Ham Net		*1 Year*	*2 Years*	*3 Years*
Clegg ZEUS	$695.00	$63.25	$34.50	$24.91
Clegg 99'r	169.00	15.03	6.95	5.72
Clegg Interceptor rcvr	473.00	42.83	23.33	17.91

99'r CLEGG Transceiver for 6 Meters . . . $139.00

TRADES!!!

We need your trade. You won't believe what we can offer for it . . . let us startle you!

AMATEUR ELECTRONIC SUPPLY

Two Stores to Serve You
PLEASE SEND MAIL ORDERS TO MILWAUKEE STORE

MANAGER, STEVE, W9EAN

MILWAUKEE, WISCONSIN
3832 Lisbon Avenue
Phone: WEst 3-3262

MANAGER, "DOC", W9HJS

CHICAGO, ILLINOIS
6450 Milwaukee Avenue
Phone: ROdney 3-1030

Amateur Electronic Supply—Mail Order Dept. C-87
3832 W. Lisbon Ave., Milwaukee 8, Wisc.

Ship me .....

I enclose $..... I will pay the balance in

☐ 1 year ☐ 2 years ☐ 3 years ☐ C.O.D.

I want to buy ..... and want to trade

..... What's your deal?

Name .....

Address .....

City ..... State .....

☐ Send reconditioned equipment bulletin

For further information, check number 27, on page 126

THE CQ HAM MART

COMMAND SETS

This is a collection of reprints, containing all of the available information on the conversion of the popular "Command" transmitters and receivers into good ham transmitters and receivers. Invaluable for Novice, Technician, General, Advanced and Extra class operators. 136 fabulous pages, only *$1.50* postpaid.

THE NEW RTTY HANDBOOK

A treasury of vital and "hard to get" information. Loaded with equipment schematics, adjustment procedures, operating procedures, etc. A valuable asset to both the beginning and the experienced RTTY'er. Special section on getting started, all written by *Byron Kretzman, W2JTP*, a well known authority in the field. This book is a must for your library! Only *$3.95*.

SIDEBAND HANDBOOK

Written by *Don Stoner, W6TNS*, was almost one full year in the preparation of this terrific volume. This is not a technical book. It explains sideband showing you how to get along with it . . . how to keep your rig working right . . how to know when it isn't . . . and lots of how to build-it stuff, gadgets, receiving adaptors, exciters, amplifiers. Price, only *$3.00*.

CQ ANTHOLOGY

Most amateurs do not have a good file of back issues of *CQ*. So we've looked back through the years *1945-52* and assembled all in one place the articles that have made a lasting stir. The issues containing most of these articles have long ago been sold out. The price is a mere *$2.00*.

VHF FOR THE RADIO AMATEUR

You can't afford to be without this dynamic new handbook designed with the VH Famateur in mind. Filled from cover to cover with all new and original construction material presented so that you can understand it. Written by *Frank C. Jones W6APF*, nationally acclaimed for his VHF pioneering. Available now for only *$3.50*.

CQ LICENSE GUIDE

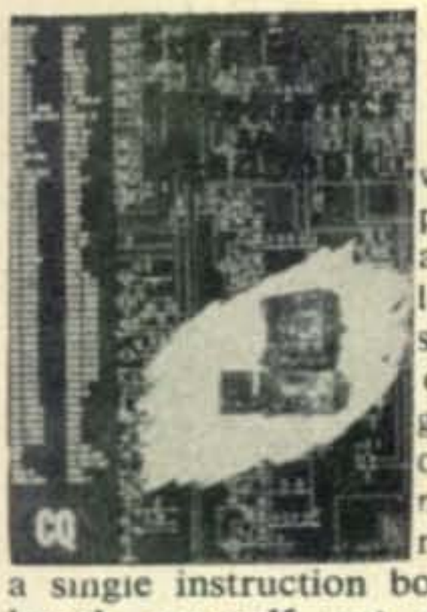
212 pages of everything the Amateur must have to get his license and progress toward the general class ticket. Plus many additional pages of vital information for the ham operator. All this for only *$2.50*.

TVI HANDBOOK

W1DBM's TVI book (2nd edition) covers all aspects of curing TVI from both the Ham's viewpoint and that of the TV viewer or the TV serviceman. It includes 2- and 6-meter TVI as well as Citizen's Band, Industrial, Medical and Utility TVI. Profusely illustrated with diagrams, photos, charts, tables and FCC regulations pertaining to radio and television interference. Price *$1.75* postpaid, USA, *$2.00* foreign.

MOBILE HANDBOOK

Anyone who tries to go mobile without getting this book, should think twice before going ahead. *Bill Orr, W6ASI* has put everything you need to know in this book, Build-its by the dozen . . . solutions to ignition problems, keeping the battery charged, noise . . . only *$2.95* postpaid.



SURPLUS SCHEMATICS HANDBOOK

This is a book literally loaded with schematics for all the currently popular pieces of surplus gear. Most amateurs are well aware of the problems encountered in purchasing seemingly inexpensive surplus units, only to find that no schematic diagram is available. Trying to figure out the circuitry cold turkey can be many times more difficult than the most involved puzzle, and purchasing a single instruction book can run as high as $3.50. Why knock yourself out when you can have a book with complete coverage on hand in your library? All this for only *$2.50*.

DIODE SOURCE BOOK

Cat. #150 Up-to-date individual charts of all diode types compiled by National Bureau of Standards. Enables user to select the right diode for a particular application. Includes separate source chart listing diodes and manufacturers. Contains design article for each diode type. 126 Pages.

USA-CA RECORD BOOK

This book contains county outline maps of all 50 states, rules, regulations, certification forms, alphabetical list of counties by state, cross-indexed maps. 108 pages, 8½ by 11". Price only *$1.25*, postpaid. *USA-CA Custodian Clif Evans, K6BX*, Box 385, Bonita, California.

DX ZONE MAP

Amateur Radio World-Wide DX & Zone Map complete, and up to the minute with Prefix Zone Boundaries, Great Circle beam bearings. 4 colors, 36 by 42 inches on heavy vellum paper. Mailed in heavy cardboard mailing tube. Only *$3.00*.

HAM'S INTERPRETER

Now you can talk in broken *French, Spanish, Italian, German, Swedish, Serbo-Croat* [*Yugoslav*] *Russian, Finnish,* and *English*. This handy little book gives all the popular ham conversation in nine languages, including letters and numbers. Only *$1.50* postpaid.

ATLAS

This is a reference book that will be put to good usage around your house if you have any children. 7 lbs. of colored maps and all up to date information for only *$15.00*, and you get a years subscription to *CQ*.

19" GLOBE

Here is a chance to preserve your breath for posterity! This beautiful *World Globe*, made by *Hammond*, is a must for every hamshack. Plain for *$19.95* or lighted for *$24.95*. One year subscription free with the purchase of either globe.

BINDER

There is no other good way to keep your back issues. Keep them neat, and in order. We supply the binder, with the year embossed in gold, not merely a sticker which will come off later. Specify what year you want stamped on your binder. *$4.00*.

COWAN PUBLISHING CORP. CQ-H
Book Division
300 West 43rd Street
New York 36, N. Y.

LIGHTED GLOBE	$24.95	☐
UNLIGHTED GLOBE	19.95	☐
ATLAS	15.00	☐
COMMAND SETS	1.50	☐
CODE RECORD (not shown)	3.50	☐
REGULAR LOG SHEETS (100)	1.00	☐
SSB LOG SHEETS (100)	1.00	☐
HAM'S INTERPRETER	1.50	☐
TVI HANDBOOK	1.75	☐
BINDER—YEAR WANTED	4.00	☐
VHF FOR THE RADIO AMATEUR	3.50	☐
CQ ANTHOLOLOGY	2.00	☐
HI-FI BOOK	2.50	☐
SIDEBAND HANDBOOK	3.00	☐
CQ LICENSE GUIDE	2.50	☐
SURPLUS SCHEMATICS HANDBOOK	2.50	☐
DX ZONE MAP	3.00	☐
NEW RTTY HANDBOOK	3.95	☐
DIODE SOURCE BOOK	2.50	☐
USA-CA RECORD BOOK	1.25	☐

SIRS: My check (money order) for $_____ is enclosed. Please send the following items to:

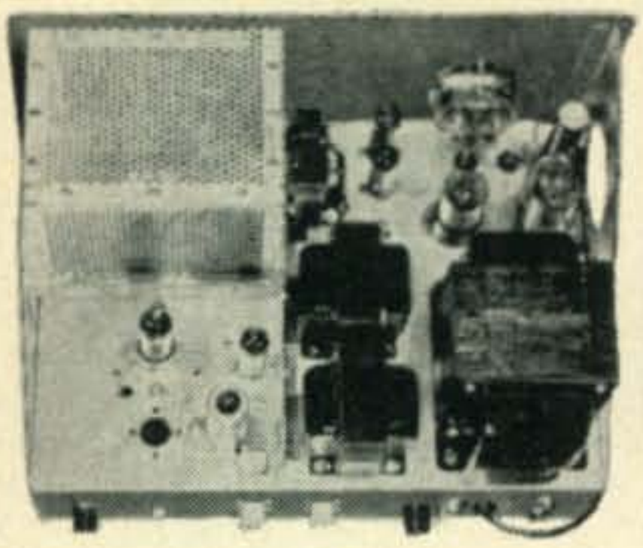
Name_____

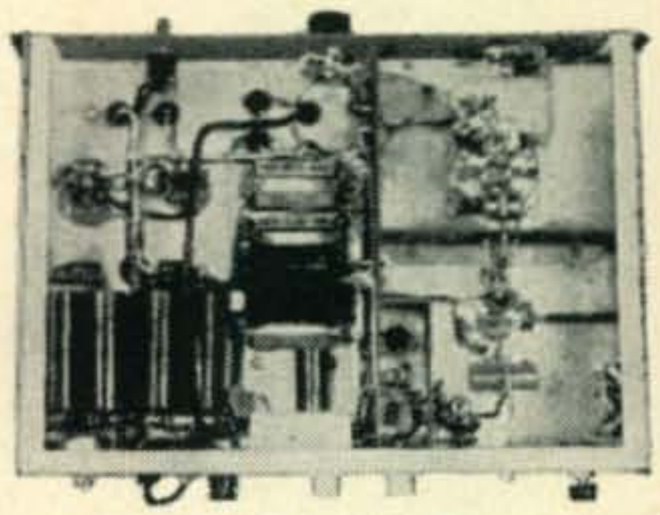
Address_____

City_____ Zone____ State_____

New York City Residents Add 3% Sales Tax

175 WATTS SSB ON SIX METERS with P & H 6-150 TRANSMITTING CONVERTER





Here's the simple, easy way to go VHF on SIX METERS! Just feed the 20 meter output of your present SSB, AM or CW exciter into the P&H 6-150 and you have 175 Watts PEP on SIX METERS, either crystal or VFO controlled, depending on your exciter features. Resistive Pi-Pad and switchable Half-Power Pad permits operation with any 5 to 100 Watt exciter. Since the 6-150 is a high stability mixing device, the output signal stability is the same as that of your exciter. Uses a 6CX8 crystal oscillator/ Class A buffer; a 6360 Balanced Mixer and a NEW AMPEREX 8117 push-pull output tube. Power input to 8117 final: 175 Watts PEP on SSB, 165 Watts CW, 90 Watts linear AM. Entire chassis and all shielding is COPPER PLATED. Output jack provided to furnish oscillator signal injection for receiving converter. Quiet 200 CFM forced-air cooling. 50-70 ohm input and output impedances. Husky built-in power supply has three separate rectifiers and filter combinations. Meter reads; PA GRID, PA PLATE and RELATIVE RF OUTPUT. Modernistic curved corner grey cabinet; 9" X 15" X 10½". The P&H 6-150 is so thoroughly shielded, by-passed and parasitic-free that it operates as smoothly as an 80 meter transmitter. COMING SOON! THE P&H 2-150 FOR TWO METERS!

Complete — With Built-in Power Supply, All Tubes and Crystal, for Only $299.95

WRITE FOR LITERATURE

P & H ELECTRONICS INC.
424 Columbia , Lafayette , Ind.

For further information, check number 28, on page 126

BRAND NEW! THE RADIO AMATEURS WORLD ATLAS!

Now, for the first time a world atlas compiled especially for radio amateurs. Contains all 6 continents of the world plus the polar projection and West Indies-Caribbean area. Country prefixes and zone boundaries on every map plus complete index. Ideal set of maps for field trips or ham shack. 16 pages, 8¾" x 12", 4 colors on quality paper. From your favorite dealer or order direct.

$1.00 postpaid

RADIO AMATEUR CALL BOOK, INC.
4844 Fullerton Ave. Dept. CQ8 Chicago 39, Ill.

FREE Catalog

OF THE WORLD'S FINEST ELECTRONIC GOV'T SURPLUS BARGAINS

HUNDREDS OF TOP QUALITY ITEMS — Receivers, Transmitters, Microphones, Inverters, Power Supplies, Meters, Phones, Antennas, Indicators, Filters, Transformers, Amplifiers, Headsets, Converters, Control Boxes, Dynamotors, Test Equipment, Motors, Blowers, Cable, Keyers, Chokes, Handsets, Switches, etc., etc. Send for FREE CATALOG—Dept. CQ.

FAIR RADIO SALES
2133 ELIDA RD. • Box 1105 • LIMA, OHIO

NEW CLEGG 99er's

NEW PRICE $159.95

SPECIAL
WHILE OUR PRESENT STOCK LASTS
$139.95

GRAHAM RADIO, INC.
505 MAIN STREET, READING, MASSACHUSETTS
TEL. 944-4000

RTTY [*from page 97*]
you have only invested a couple of stamps. (You should see *my* telephone bill!) As soon as anything concrete develops, like a package of boards, we will let you know, poste haste.

On the Bauds

WA2LCZ, Treasurer of the Dartmouth (College) Radio Association reports the acquisition of a Model 28 for use with their KW-1 at W1ET. WA2WUV of Massapequa, Long Island, is readying a Model 28ASR and an Electrocom FSC-250 TU for large volume traffic handling. W2IZQ of Ramsey, New Jersey, is the co-author of a fine book, *Radio Transmitters,* (McGraw-Hill) which *does* mention RTTY.

W5APM of San Marcos, Texas, now has an AN/URA-8 TU such as described in the June RTTY COLUMN. W5CZC is now DL5IA. K5OMQ of Roswell, New Mexico, is looking for a manual on the CV-31B-TRA7 Dual Diversity Converter. *(Can anyone help?)* K8WVL of the St. Joseph High School Radio Club in Cleveland, Ohio, reports very adequate RTTY facilities: a 28KSR and a 28ASR, a kw on all h.f. bands, and a 2 meter kw for moonbounce experiments on 145.200 mc.

K9KNJ of Milwaukee, Wisconsin, reports about 25 stations on 146.94 mc f.m. as well as a dialed autostart net on 147.00 f.m. in the Milwaukee area. W9UE of Chicago is looking for more Kleinschmidt gear, this time a TT-4A and a TT-76(A). KØPEF, ex-W9CKU, is back on the air after 25 years with a Model 15 from Sioux Falls, South Dakota. By sometime in September Ray Morrison, W9GRW, will have a Bell System TWX installed in his home. The number will be 312-677-6151.

DL5IA is on from Munich, Germany, with a Model 15. He reports DJØEK, DJØDD and DJØBX on 20 meters, just above 14,100 kc. German amateurs, incidentally, require special permission to use F-1 and are restricted, 3575 to 3600 on 80 and 14,100 to 14,125 on 20 meters. DJØBT will soon be on, too.

VE4BJ (Bill Stunden) of 578 Oxford Street, Winnipeg, Manitoba, would like to be listed as a VE willing to help out the local newcomer. Bill also has a Model 26 for sale. VE4WR, also of Winnipeg, is on with a Lorenz page printer, a KWM-2 with 30S-1, and a W4TJU TU with a W2JAV a.f.s.k. oscillator.

W6CG, DX Editor of *RTTY,* the monthly bulletin of the RTTY Society, Inc., of Southern California, reports KH6IJ headed for Pakistan with RTTY gear and a hitch with SEATO. I1RIF roars into the West Coast from early in the afternoon until late at night, according to Bud.

ZS6ARL, ZS6UR, and ZS6PC operate around 14,090 kc from 1900 to 2000 GMT. Watch for them.

Comments

So you need TTY tape? There is available to RTTY societies and to other quantity ama-

Terry's Making . . .

UNBELIEVABLE TRADE IN DEALS

ON

HALLICRAFTERS

HT-37

"You won't believe my offer! Rush coupon today." King of Traders . . . Terry (W9DIA)

Ham Net **$495**

$5 DOWN

Only $17.69 Per month (three years)

Take Full 3 Years to Pay Balance

You'll never get a better deal than right now on this precision CW/AM/SSB xmitter. 70-100 watts P.E.P. output CW or SSB. 17-25 watts output AM. Ideal CW keying; full voice control system. 52 ohm pi-network output for harmonic suppression.

RECONDITIONED EQUIPMENT . . . In "like new" operating order. Send for long list of top values. Check coupon.

SERVICEMEN: We can sell you on regular credit terms. Write for our deal. We dismantle the HT-37 for A.P.O. delivery.

Amateur Electronic Supply

Milwaukee: 3832 W. Lisbon (WEst 3-3262)
Chicago: 6450 Milwaukee Ave. (ROdney 3-1030)

Amateur Electronic Supply
Mail Order Dept. C-82
3832 W. Lisbon Ave.,
Milwaukee 8, Wisc.

Ship me the HT-37. I enclose $5 and want to pay:

☐ COD ☐ 1 Year ☐ 2 Years ☐ 3 Years

I have a .....to trade. Whats your deal?

Name .....

Address .....

City .....Zone.....State.....

☐ Send Reconditioned Equipment Bulletin

For further information, check number 30, on page 126

CALL-IDENT TYMETER©

10-MINUTE STATION CALL REMINDER

24 HOUR CLOCK

#124

22.50

Plus applicable taxes

10-minute repeating timer buzzes warning to sign in your call letters. Walnut or ebony plastic case. H4", W7¾", D4". Wt. 3 lbs. 110V, 60 cy. 1 year guarantee.

At Your Dealer, or WRITE TO

TYMETER ELECTRONICS

PENNWOOD NUMECHRON CO.

7249 FRANKSTOWN AVE., PITTSBURGH 8, PA.

OWNERS

Dx-100

The most popular rig on the air can be increased in power by 50%. Add another 6146 and run 300 watts SSB and CW, 240 watts A.M. Complete kit with instructions, $19.95. Similar kit for "APACHE".

W4KUV — W4NZS

Best Radio Service 610 N. Madison Goldsboro, N.C.

LAST CHANCE

to Save **$30.00**

on factory fresh CENTRAL ELECTRONICS

MM-2 MULTIPHASE R. F. ANALYZER

$5 DOWN—Take 2 years to Pay. ($5.75 a month)

Final factory stock clearance. Analyzes all xmitter functions plus I.F. patterns of incoming signals. No tuning. Regular price $149.50—

OUR PRICE, ONLY $119.50

CLOSE OUT!
10B Exciter
Only a few factory wired units left. $5 down. Full price $129.95 Hurry! $5 Down—$6.41 a month (2 years)

MM—2 ACCESSORIES
RM 50 for 50kc. ... $12.50
RM 80 for 80kc. $12.50
RM 455 for 455-500kc. I F $12.50

Amateur Electronic Supply
Dept. C-81 3832 Lisbon Ave.
Milwaukee 8, Wisconsin

ORDER COUPON

Enclosed $..... Ship me .....

I will pay balance in ☐ 1 year ☐ 2 years

Name .....

Address .....

City ..... Zone ..... State .....

☐ Send latest Reconditioned Equipment Bulletin

For further information, check number 31, on page 126

teur RTTY buyers a large quantity of 11/16" oiled canary tape on rolls 8" in diameter and with 1" cores. This tape was made to government specifications and is packed 40 rolls to a case. Each case weighs 47 lbs. If you can use this tape in quantity, contact Mr. K. Y. Hoo, 427 Decatur Street, New Orleans 16, La.

73, Byron, W2JTP

YL [*from page 98*]

months the a.m. portion of LCL meets Mon. 1000 MST on 7235; c.w. portion on Wed. 0900 MST on 7100.

The Upper Peninsula YL Club is sponsoring the Hiawatha Land Certificate. Requirements are 50 contacts with hams (OM or YL) in the Upper Peninsula of Michigan, five of whom must be members of the UPYL club. W8HAV, Zelma, is custodian.

Results YLRL VHF Contest

YLRL V.P. K2JYZ reports the results of the v.h.f. contest held Apr. 11-12 were very disappointing, but they plan to try it another year and hope for increased participation. Top scorers in this year's contest are: K1OLM, Joyce, 75 points; WA6IZO, Elayne, 74 points; K3NBS, Phyllis, 50 points.

Note the rules for "Howdy Days" in separate box. This contest is to start off the fall and winter season. Lend a hand to new YLs—extend an invitation to join YLRL; acquaint them with the YL nets and other activities, especially the Anniversary Party (Oct. 24-25 for c.w.; Nov. 7-8 for phone).

33, W5RZJ

Aves Island [*from page 36*]

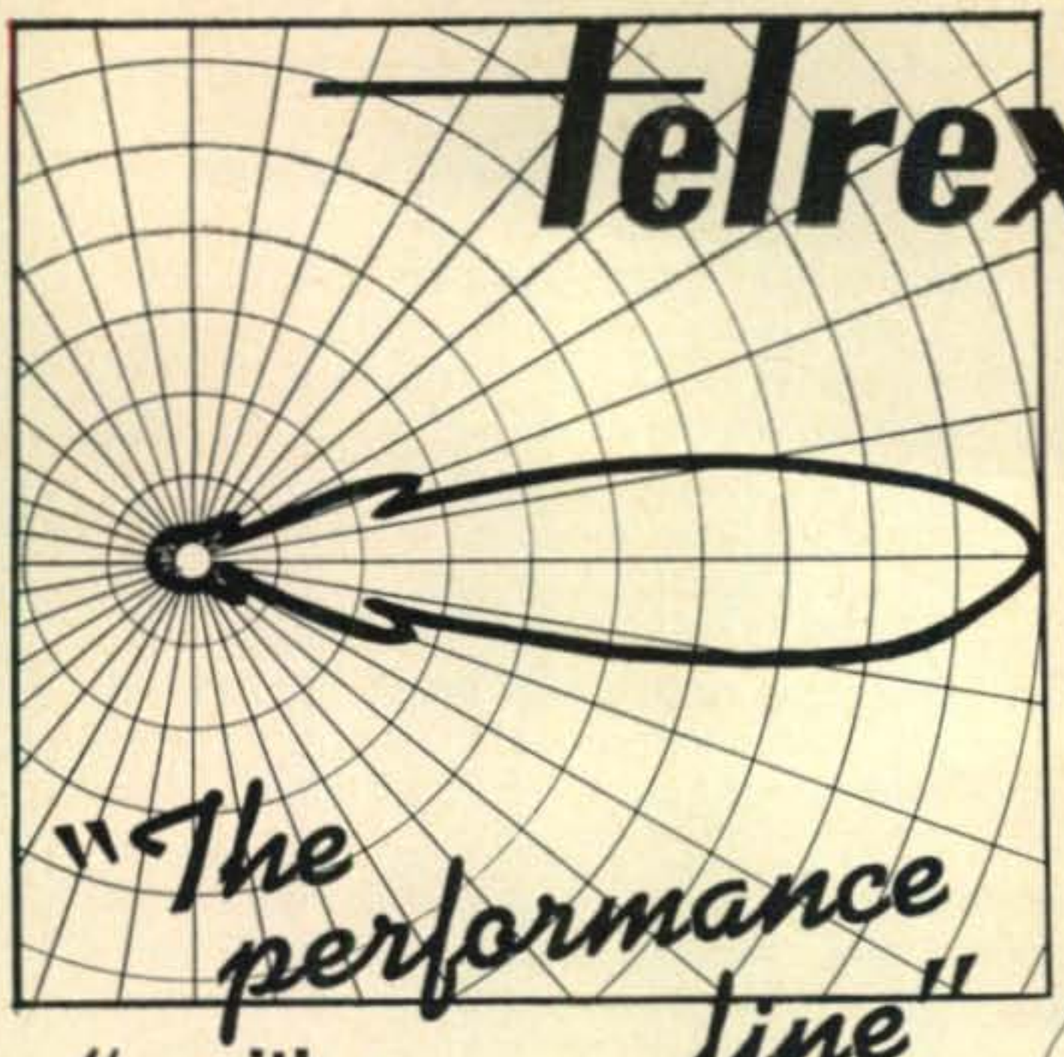
A quick CQ resulted in a QSO with Johnston Island. Four hours later the power plant at the s.s.b. camp failed. For three hours Goyo and myself tried to put it back in operation without success. We decided to get some sleep, until the sun came up which would make our work a little easier. The a.m. camp on the south end of the island was the only one without a problem.

Just as the sun was rising, the band opened via the long path to Asia. New Zealand, Australia and many stations were worked in these during both mornings of our stay. Most European stations were worked long path. Surprisingly, only a few South American stations were heard with good signal strength. About this time, the stateside QRM started. They sounded *stronger* than the stations located on the opposite end of the Island.

The wind was so strong that the beam would not rotate and to change the direction of the beam necessitated tieing long ropes to the end of the boom and swinging it around manually.

The Return Trip

The two days of operation passed very rapidly and when the time came to break camp we



"— with a MATERIAL DIFFERENCE!"

"BEAMED-POWER" ANTENNAS and ANTENNA SYSTEMS

The Choice of the Discriminating Communication Engineer . . . the Man who Never Settles for Anything Less than THE-VERY-BEST!

You too — can enjoy World renowned Telrex performance and value!
Send for PL77 condensed data and pricing catalog, describes 107 popular amateur antennas from $6.95 to $999.00. Expanded data sheets — Your favorite band, also available.

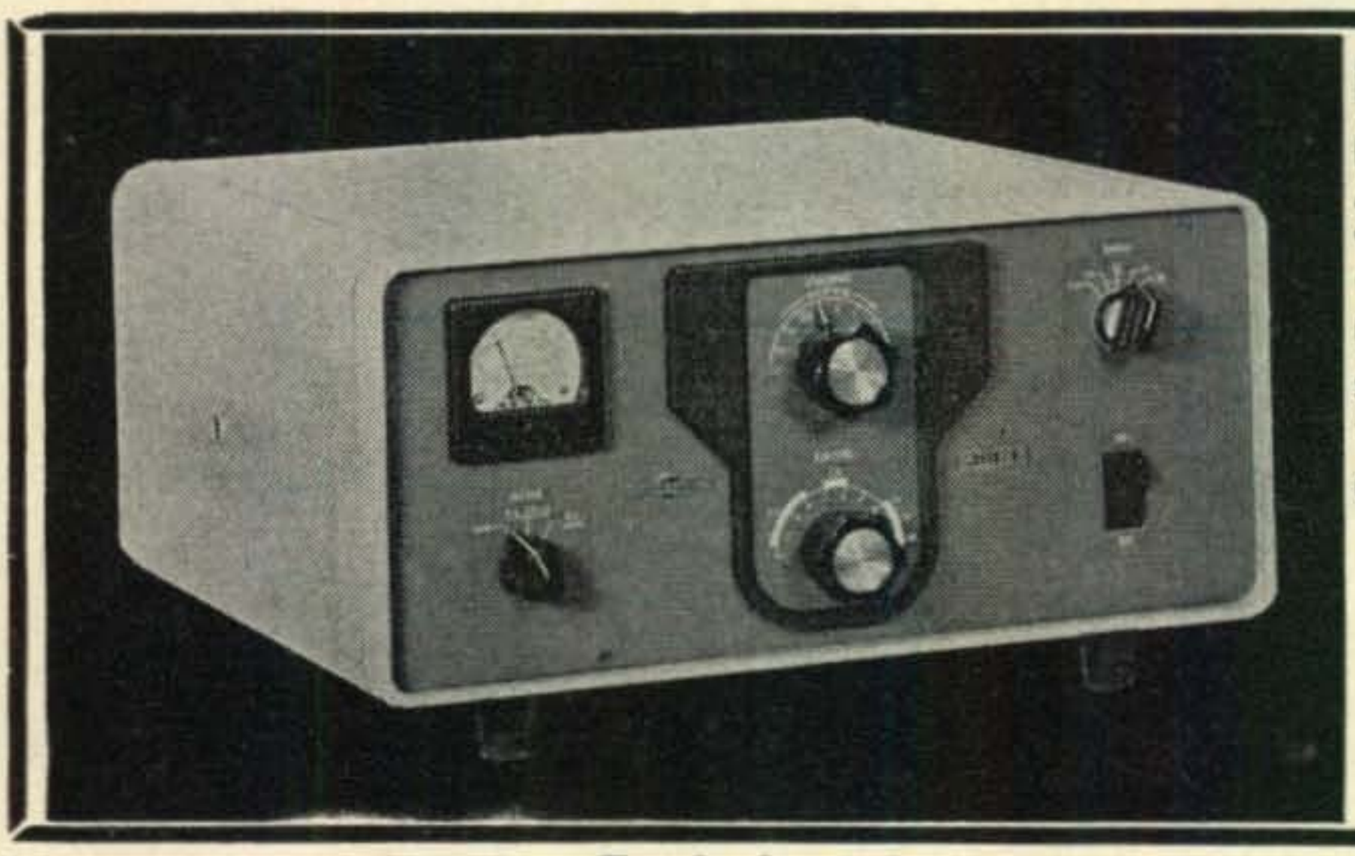
ANTENNAS SINCE 1921

Communication and TV Antennas

telrex LABORATORIES

ASBURY PARK 25, NEW JERSEY, U.S.A.

For further information, check number 32, on page 126



HOW COMPACT CAN YOU GET?

(as compact as Collins has made the 30L-1). This tightly engineered, new 1000-watt linear amplifier is the same size as the famous Collins KWM-2. It has a self-contained power supply, too. Its price: $520. Its appearance: "solid quality". Order the Collins 30L-1 now, for early delivery.

C & G ELECTRONICS
Northwestern headquarters for Collins
2502 Jefferson Avenue, Tacoma 2, Wash.
2221 3rd Avenue, Seattle 1, Wash.

For further information, check number 33, on page 126

SUBSCRIPTION ORDER

C-8

CQ Magazine 300 West 43rd Street, New York 36, N. Y.

☐ New
☐ Renewal

Subscription Rates: 36 issues—$13.00; 24 issues $9.00; 12 issues $5.00*
*The above rates apply to U.S. Possessions, APO, FPO, Canada & Mexico.

Sirs: Here is my remittance for $..... Enter my subscription order to "CQ" for the next .....issues.

Name..... Call.....

Address .....

City..... Zone..... State.....

Pan-America and all other foreign: 1 yr. $6; 2 yrs. $11; 3 yrs. $16.

GUARANTEED CRYSTALS!

ALL MARINE FREQ.-FT-243, DC-34 Holders. Tol. .005... $2.50
POLICE, C.A.P., CD, MARS. Tol. .01%..... $2.00
CITIZENS BAND—11 METERS—.005% Tol.
26.965 to 27.225 MC, 3rd Over. Herm. Seal or FT-243 $2.95
13.4825 to 13.6125 MC, 2nd Harm.Herm. Seal or FT-243 $2.95
6741.25 to 6806.25 Kc, 4th Harm. FT-243 only..... $2.50

SPECIAL! STOCK CRYSTALS

FT-243 Holders 5700 KC to 8700 KC in steps of 25 KC's

$1.19 ea.

SEND FOR FREE CATALOG

DC-34 Holders 1690 KC to 4400 KC steps of 10 KC ea. $1.19

NOVICE BAND FT-243 Fund. 1.49 ea.
80 Meter 3701-3748—Steps of 1 KC. FT-243
40 Meter 7150-7198—Steps of 1 KC. FT-243
Dbl. to 40 Meter 3576-3599. Steps of 1 KC. FT-243
15 Meter 5276-5312—7034-7083 Steps of 1 KC. FT-243

FT-243—2 Meters (Steps of 1 KC) $1.49
FT-243—6 Meters (Steps of 1 KC) $1.49
FT-243—From 3000-4000 ..... $1.49
FT-243—From 1005-2999 (Steps of 5 KC) $2.50
FT-241 SSB Low Freq. Xtals 370 to 540 KC
(Steps of 1.852 and 1.388) ..... $ .69
FT-241 SSB Matched Pairs $2.39

Include 5c per crystal for postage (U. S. Only) Calif. add 4% Tax. No C.O.D.'s. Prices subject to change. Ind. 2nd choice; substitution may be necessary. MIN. ORDER $2.50

"The House of Crystals"

U. S. CRYSTALS, Inc.

1342 S. La Brea Ave. Los Angeles 19, Calif.

For further information, check number 34, on page 126

CUT HOLES FAST

GREENLEE CHASSIS PUNCHES

Make accurate, finished holes in 1½ minutes or less in metal, hard rubber and plastics. No tedious sawing or filing — a few turns of the wrench does the job. All standard sizes . . . round, square, key, or "D" shapes for sockets, switches, meters, etc. At your electronic parts dealer. Literature on request.

GREENLEE TOOL CO. GREENLEE
2028 Columbia Ave., Rockford, Illinois

For further information, check number 35, on page 126

found that nearly 4,000 QSOs were entered in the log representing all Continents and about 70 Countries.

Several firsts were made during our stay on the Island; The principal one being a birthday celebration for our club president Goyo. We gave him a nice party one night and it was the first celebration of this kind on the Island. The second one was the first phone patch on the Island. Field telephones were installed between th three camps and one morning at about 8:00, the a.m. camp rang the bell and told us that Susan, YV5AFF, Goyo's wife, was calling him on a.m. The phone patch was made by putting the mike over the telephone and vice versa and the first telephone call from the Island was made!

One final word about the rigs and antennas. The c.w. camp used a Johnson Valiant and Ranger. The antenna was a long wire and receivers were a Drake 2B and Hammarlund HQ-170. The s.s.b. camp used a KWM-2 with an auxillary p.t.o. and a B&W 5100B with 51-SB sideband adapter and a Collins 75A-4 was also used. The antennas consisted of a TA-33 and TA-2.

The a.m. gang used a Hy-Gain vertical and several dipoles with a complete Harvey-Wells rig, including transmitter, receiver and *Z*-match. A Heath Apache and Hammarlund HQ-170 were also used at the a.m. station. All three camps used Onan power generators. An effort was made to use all bands from 80 to 6 but conditions were extremely poor on both 10 and 6 meters during our stay on the Island.

Heavy seas made transfer to the Destroyer difficult and many of our rigs were given a severe dousing of salt water. About three hours later, everything was safely aboard the *Aragua*.

We were a sad looking buch upon our return to Laguaira; dirty, unshaven, covered with bird droppings, salt, mud and peeling skin but we were all very happy. All of us, the gang from YVØAA, would like to thank the Venezuelan Navy for its cooperation and, of course, all the stations contacted for their help in making the Aves Island DXpedition a success. We hope we will meet you all again from this same rare spot sometime soon. ■

KWM-1 Adapter [*from page 34*]

itors in the oscillator section for optimum performance. This can be judged by either noise or a signal. Forty should now be as hot as a firecracker.

Transmitter Tune Up

With K_1 energized, check the static plate current of the 6146. With 50 volts of bias it should range from 25 to 30 ma. De-energize K_1 and tune up the KWM-1 in normal fashion, raising the mike gain for some carrier insertion to the Heterodyner. Using a v.t.v.m. and an r.f. probe, check at the swamping network for

the presence of r.f. Keep the level low so as not to overdrive V_4. Adjust the pi network in the plate of V_4 for maximum output on 7,210 kc. Use a grid dipper, in the wavemeter function, tuned to 7,210 kc and coupled to L_7, as an indicator. It would also be best, at this time, to adjust the 3-30 mmf trimmer between V_{3B} and V_4 for maximum output as shown on the g.d.o.

Next, tune the driver stage, V_6, and keep an eye on the plate meter. Don't let the 6146 run wild. Tune the driver for maximum output as indicated by the g.d.o. coupled to L_8.

Dip the final plate and load out to 150 ma with the plate dipped as the last adjustment. Set the KWM-1 for sideband operation. The 6146 plate current should drop back to 25 or 30 ma. Adjust the KWM-1 mic gain to where voice peaks kick the adapter meter up to about 75 ma. Don't get ambitious at this point and start a flat-topping operation. This adapter is the same as any other s.s.b. rig and will put out a bad signal if driven too hard. So, for Pete's sake, keep that "à lá Collins" quality that you have there. You will note that your ALC will just barely flicker when the correct amount of drive is being used. Take a look at the voltage regulator, V_5, and be sure it stays ignited when switching from receive to transmit.

Conclusion

You have probably concluded by now that I am not a literary genius, but I do hope all who demanded that this article be written have enough to get started on a real worth while project. You have heard the signal on the air and know that it sounds like a million bucks. I used the Heterodyner barefoot for a while, but am now driving a 700 watt grounded grid linear and am having a ball on a mighty fine band. See you on 40. Maybe we should try for 80 . . . ? ? ? ? ■

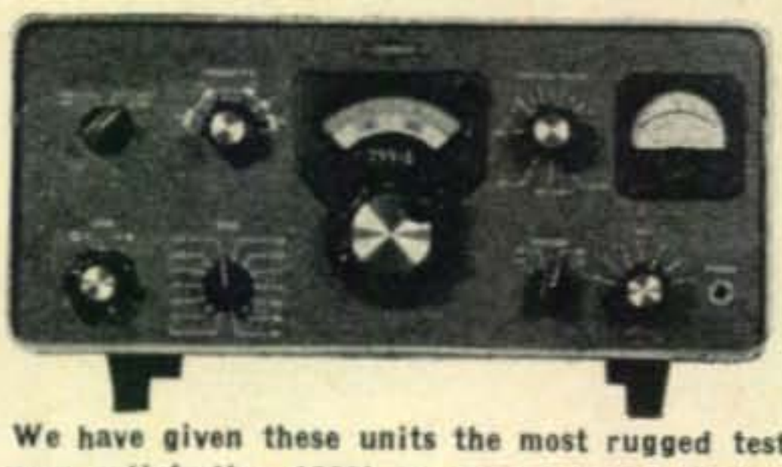
One Tube, 30 Watts [*from page 27*]
on the fundamental frequency. If you have trouble getting the circuit oscillating, try several crystals as you may have a bad or sluggish crystal.

When the 50 ohm antenna is connected in place of the lamp bulb, the tuning will have to be touched up as there is a change in impedance. A good way to tune is by watching a field strength meter and note the maximum output.

Now that the transmitter is finished you may feel as I did; I wished I had built it last year for this years vacation. I kept putting it off until vacation time was here and then it was too late to haul it along. My advice to all portable rig luggers is to size up next year's vacation trip and plan now. Build it before you need it. You'll find, when you go on a trip, it will be handy to have in case you have to radio home for more money. ■

Terry (W9DIA) Says . . .

"KWM-2 OWNERS —GO MOBILE AT FAR LESS COST-



with an ADCOM DC Power Supply!"

We have given these units the most rugged tests . . . we guarantee your satisfaction 100% or money back! These power supplies provide low ripple outputs . . . no need for extra filtering. Short-circuit proof. Instant starting under full load. Go mobile for a fraction of the cost! $5 down . . . 1-2-3 years to pay!

ADCOM 250

SPECIFICATIONS

Input	12-14V.DC
Output (at 13V.DC input)	275V.DC 200MA
simultaneous ICAS loads	90V.DC negative. Zener regulated
800V.DC 250MA	Adjustable 0-30V.
Size	4½" x 7" x 9"
Weight	Approximately 7½ lbs.

$125 Ham net

$5 DOWN

only $6 a month (two years)

ACCESSORIES

Make up your own cable or we'll supply genuine Collins cable 440 E-1 for $17.00

Complete Collins mobile mount 351D-2 . . . $120.00 ($5 down) $5.75 a month (2 years)

Amateur Electronic Supply
Milwaukee: 3832 W. Lisbon Ave.
Chicago: 6430 Milwaukee Ave.

ADCOM 500

a real powerhouse

SPECIFICATIONS

Input	12-14V.DC
Output (at 13V.DC input)	300V.DC 200MA
Simultaneous ICAS loads or CCS SSB	90V.DC negative. Zener regulated.
250V.DC 400MA	Adjustable 0-90V
400V.DC or	
Size	4½" x 7" x 9"
Weight	Approximately 8 lbs.

$150 Ham net
$5 DOWN
$5.22 a month (three years)

Amateur Electronic Supply
Mail Order Dept. C-83
3832 W. Lisbon, Milwaukee 8, Wisc.

HANDY ORDER COUPON

I enclose $..... Ship me .....

.....

PREPAID. I will pay balance in:

☐ 1 Year ☐ 2 Years ☐ 3 Years

Name .....

Address .....

City ..... Zone..... State.....

☐ Send latest Reconditioned Equipment Bulletin

For further information, check number 36, on page 126

OM . . . I'm trading

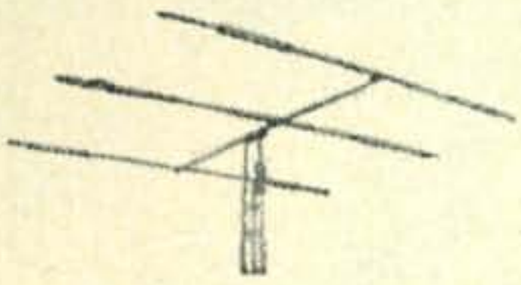
Fabulously

on the Mosley

CM-1 RECEIVER

Ham Net **$182.70** **$5 DOWN** **$6.41** per month (three years)

Matching Speaker CM S-1 $16.95



Model TA 33

for 10-15-20 Meters

Low SWR. One feed-line. Handle full KW.

Stay on the Air Plan

Why go off the air? Deal with Terry and use your trade-in until your new gear arrives.

Only $5 DOWN

Puts any Mosley beam OVER your shack including the ever popular

TA 33

Ham Net $99.75

Per month $5.13 (24 months)

Complete Stock Mosley Antennas. Ask for full catalog.

WRITE FOR QUOTATION

on combination deals of Mosley antenna of your choice plus tower and rotor of your choice. We'll save you lots of money!

AMATEUR ELECTRONIC SUPPLY

3832 W. Lisbon Ave., Milwaukee 8, Wisc.

Amateur Electronic Supply, Mail Order Dept. C-85
3832 W. Lisbon Ave., Milwaukee 8, Wisc.

Ship me ..... I enclose $5 and want to pay:

☐ COD ☐ 1 Year ☐ 2 Years ☐ 3 Years

I have a .....to trade. Whats your deal?

Name .....

Address .....

City .....Zone.....State.....

☐ Send Reconditioned Equipment Bulletin

For further information, check number 37, on page 126

Ham Shop

Rates for the HAM SHOP are 5¢ per word for advertising which, in our opinion is obviously of a non-commercial nature. A charge of 25¢ per word is made to all commercial advertisers or business organizations.

Your copy should be preferably typewritten, double spaced on one side of the page only.

We do not bill for advertising in the HAM SHOP Full remittance *must* accompany all orders.

Closing date is the 15th of the 2nd month preceding date of publication.

We reserve the right to reject advertising which we feel is not of an amateur radio nature.

Because the advertisers and equipment contained in the HAM SHOP have not been investigated, the publishers of *CQ* cannot vouch for the merchandise listed therein.

"The VHF Amateur" At last a magazine for VHF'ers! Don't miss a single issue! Send $2.00 for year or $1.00 for six big issues. 67 Russell, Rahway, N.J.

ATTENTION Mobileers! Heavy duty Leece-Neville 6 volt 100 amp system $50; 12 volt amp system $50; 12 volt 60 amp system $60; 12 volt 100 amp system $100. Built in silicon rectifier alternators 12 volt 60 amps $100; 12 volt 100 amps $125. Guaranteed no ex-police car units. Herbert A. Zimmermann, Jr., K2PAT, 1907 Coney Island Ave., Brooklyn 30, N. Y. Tel. DEwey 6-7388.

ONE THIN DIME brings 50 page eye-popping war surplus electronics catalog. Fabulous bargains. Meshna, Lynn, Mass.

TOROIDS: Uncased 88 mhy like new. Dollar each. Five $4.00 P.P. DePaul, 309 South Ashton, Millbrae, Calif.

WANTED: Teletype printers, perforators, reperforators transmitter-distributors test equipment: Model #14, #15, #19, #26, #28, etc. All types Collins receivers, 51J, R-388, R-390, 75A, etc. Cash, or trade for NEW amateur equipment. Write Tom, W1AFN, Alltronics-Howard Co., Box 19, Boston 1, Mass. (RIchmond 2-0048).

WANTED: TEST EQP'T TS or AN/URM, UPM, ARM, etc. TELETYPE TG-7, Models 14, 15, 19, 26, 28, printers & reperforators: Revrs & xmtrs: BC 610E, I; AN/GRC-3 & higher, RT-66, –67, –68, Collins 51J 17L3, –4, 18S–2, R–388 –390, –391; ARN-14 and 30; APR-9, -10, ARC-21, -34; APS-10, -31, -33, -42 etc. We pay freight Amber Industrial Corp, 75 Varick St., New York 13, N. Y.

FREE—RCA, GE, etc., tubes catalog. Discounts to 75% from list. Picture tubes at 75¢ inch and up. Parts, (Parts kits at 1/10 original cost. Needles, tube testers, silicons, seleniums, 7" TV test tube $6.99 and more. Arcturus Electronics Corp. CQ 502-22nd St., Union City, New Jersey.

PRESERVE YOUR HAM TICKET, Social Security Card, small photo, passes and anything else of value that is wallet-size. We will laminate it in clear plastic, guaranteed for life. Lamination will prevent it from getting torn, soiled or frayed. Send your ticket or anything of value with $1 in stamps or cash for each item that you want preserved. 24-hour service. Send to *CQ* Magazine, Dept. H.W., 300 W. 43rd St., N.Y. 36, N.Y.

Convert any television to sensitive, big-screen oscilloscope. Only minor changes required. Plan $1.95. Relco Industries, Box 10563, Houston 18, Texas.

Multiplex Adapter—Circuit board, set of 5 coils, sockets and complete instructions $15.00. D. L. Stoner, Box 7388Q Alta Loma, California.

COMMUNICATION. Teletype. Unusual surplus bargains. Free flyer. MDC 923 W. Schiller. Phila 40.

WANTED: BC639 receivers, advise price, condition. We pay freight. Amber Industrial Corp. 75 Varick Street, New York 13, N.Y.

FOR SALE: Complete instructions including 28 page booklet and 22" x 36" schematic for converting the ART/13 transmitter to AM and SSB. Satisfaction guaranteed. $2.50. Sam Appleton, 501 N. Maxwell St., Tulia, Texas.

USED RADIO RACK CABINETS: Panel size 12¼ x 19. Cabinet size 13 x 20 x 13. Gray wrinkle finish, $7.50 each, FOB Marietta, Pa. U.S. Aluminum Corp., Marietta, Pa.

Industrial tubes type 5555 $95.00 ea. frequency shift converters AN-7 URA-6 frequency shift converters $295.00 or will swap for other gear. Spera Electronics, 37-10 33 St., L.I.C., N.Y.

QSL's 2 color glossy . . . 100—$2.50. Samples, Dime. Frank Ramsbottom WØYBI, Box 237C, Kirksville, Mo.

TOROID BONUS: Free .033 (space 3) & .068 (mark) 200 V. mylars during June, July; August '62 with order of five toroids. 88 mhy., uncased, like new, with mounting hardware; information sheet. $1 ea. 5/$4.00 Postpaid. KCM Box 88, Milwaukee 13, Wis.

QSL's HIGH GLOSSY CARDS. Send Dime For Samples T. H. Lincoln W1IBB, 18 Hovey St., Woburn, Mass.

QSL cards—BROWNIE—W3CJI—3110 Lehigh, Allentown, Pa., Catalogue with samples 25¢.

QSLs. Samples, Dime. Print Shop, Corwith, Iowa.

QSL—Kromkote 3 color . . . order 200 get 25 each of 8 different styles—many styles. Samples 10¢—Progress Printing, Box 1154, Biloxi, Miss.

QSL's four colors glossy stock forty design send $5 for 200 and get surprise of your life. 48 hour service satisfaction guaranteed. Constantine Press, Bladensburg, Md.

GLOSSY 3-color QSL cards 100—$4.50. Free sampler. Rutgers Vari-Typing Service, 7 Fairfield Road, Somerset, N.J.

QSL's SWL's. That are different, colored, embossed card stock and "Kromekote." Samples 10¢. Home Print, 2416 Elmo, Hamilton, Ohio.

QSL's Samples 15¢. Rubber stamps: Name, Call Address $1.35. Harry Sims, 3227 Missouri Avenue, St. Louis 18, Missouri.

QSL's, SWL's, WPE, CB. Samples 5¢ Nicholas & Son Printery P.O. Box 11184, Phoenix 17, Arizona.

CREATIVE QSL CARDS—New catalog and designs being completed. Free samples and catalog. Personal attention given. Wilkins Creative Printing, P.O. Box 1064-2, Atascadero, California.

HUNDRED QSLs: 80¢. Samples, dime. Meininger, Jesup, Iowa.

QSL's-SWL's samples 10¢. Malgo Press, Box 375 M.O., Toledo 1, Ohio.

QSL's. SWL's XYL-OM's (Sample assortment approximately 9¾¢). Covering designing, planning, printing, arranging, mailing, eye-catching, comic, sedate, fantabulous, DX-attracting, protoypay, snazzy, unparagoned cards. (Wow!) Rogers, KØAAB, 961 Arcade St., St. Paul 6, Minnesota.

QSL's 100 $1.25 Free Samples. L. Keller 3036 Ridgeview, Normandy, Mo.

RUSPRINT QSLs—SWLs. 100 2-color glossy $3 postpaid; QSO file cards $1 per 100; Rusprint, Box 7507, Kansas City 16 Minnesota.

QSL's?? Religious QSL samples 20¢. WPE's?? CB's?? Sample 25¢ (refunded). Sackers, W8DED, Holland, Michigan.

QSL's Copyright design. 100 2-color, $4.00. Samples 25¢. Also other printing. Travis Tidwell, 4809 Foley Dr., Nashville 11, Tennessee.

EYECATCHING QSL's . . . Dime. Filmcrafters . . . Martins Ferry, Ohio.

PEORIA HAMFEST Sept. 16, Exposition Gardens, Peoria Area Amateur Radio Club. Tickets $1.00 until Sept. 8. Write Stan Kajawa, K9JSB, 1612 W. Columbia Terrace, Peoria, Ill.

HEATH DX40 & VF1 $75.00. Good condx. Worked WAS & WAC. Ship C.O.D. express charges. Write K5SLW, Box 355, Slidell, Louisiana for details.

Remember

YOUR mailing strip is IMPORTANT

Whenever you write to CQ concerning your subscription, change of address, or renewal, cut your mailing strip from the wrapper of your latest copy and attach it to your letter.

This will help us to find your stencil in our files which is the first step in faster, more accurate service to our readers.

CQ Magazine

300 W. 43 St., New York 36, N.Y.

EASY TO LEARN CODE

It is easy and pleasant to learn or increase speed the modern way—with an **Instructograph Code Teacher.** Excellent for the beginner or advanced student. A quick, practical and dependable method. Available tapes from beginner's alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready, no QRM, beats having someone send to you.

ENDORSED BY THOUSANDS!

The Instructograph Code Teacher literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have "acquired the code" with the **Instructograph System.** Write today for full particulars and convenient rental plans

INSTRUCTOGRAPH COMPANY

4711 SHERIDAN RD., CHICAGO 40, ILL.
4700 Crenshaw Blvd., Los Angeles 43, Calif.

TELETYPEWRITER EQUIPMENT • COLLINS

51J-3 and R-390A RECEIVERS Teletype: #14, 15, 19, 26, 28; Kleinschmidt: TT4A, TT76, TT98, etc. Telewriter Receiving Converter, etc. For general information & equipment list, write to TOM, W1AFN *ALLTRONICS-HOWARD CO.*, Box 19, Boston 1, Mass. RIchmond 2-0048.

"HOW TO MAKE MONEY IN Mobile Radio Maintenance"

AUTHORITATIVE GUIDEBOOK
ABOUT THE BOOM IN TWO-WAY MOBILE-RADIO:
GIVES FACTS, FIGURES, PAY RATES.
WRITE TODAY!

FREE

LAMPKIN LABORATORIES, INC. Electronic Div. BRADENTON, FLA.

Here is E-Z WAY QUALITY

for only $99.50

- Cranks up or down for easy access to beam and rotor
- Diagonal Bracing combats twist and torque
- Electric Arc Welded - no loose rivets or bolts to shear
- 55,000 PSI steel provides more strength per pound
- Dip Painted, tower is completely covered with rust resistant aluminum enamel
- Supports 6 or 10 M beams in winds up to 60 mph at 40 ft. NO GUYS!

Write for free literature or see your nearest dealer.

Model HD-40-P.....$99.50 (painted)
Model HD-40-G.... $134.50 (galvanized)
FREIGHT PREPAID ANYWHERE 48 U.S.A.

E-Z WAY TOWERS, Inc.

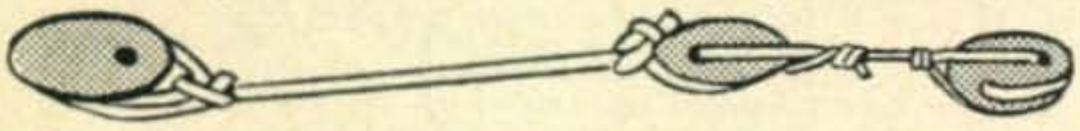
P.O. BOX 5767 TAMPA 5, FLORIDA

For further information, check number 38, on page 126

Save Shipping Charges on GLAS-LINE

NON-METALLIC GUY LINE – PERFECT FLEXIBLE INSULATOR – REVOLUTIONIZES HAM RADIO & TV ANTENNA SYSTEMS

Non-inductive, non-conducting, non-absorbing Glas-Line isolates systems from directional arrays, rhombics, etc.



Regular GLAS-LINE
with 500 lb. Tensile Strength with proper use

100' spool **$3.75** Sh. chgs paid | 600' spool **$17.84** sh. chgs paid

Super GLAS-LINE
with 1000 lb. Tensile Strength with proper use

100' spool **$6.95** Sh. chgs. paid | 600' spool **$34.75** sh. chgs. paid

USE HANDY ORDER COUPON BELOW

Amateur Electronic Supply
Mail Order Dept. C-84
3832 W. Lisbon Ave., Milwaukee 8, Wisc

WE PAY POSTAGE CHARGES

Ship me ..... Glas-Line. Ship this order PREPAID. I enclose $.....

Name .....

Address .....

City ..... Zone ..... State .....

☐ Send latest Reconditioned Equipment Bulletin

For further information, check number 39, on page 126

WØCVU the first and only amateur awarded the Empire DX Certificate on Two Way SSB. WØCVU thanks those amateurs who helped make this award possible.

FOR SALE: One kilowatt plus custom built high level 600 watt modulator—eighteen General Electric meters—inspect this beautiful transmitter and make your bid. Hubert Ingalls, McCrillis, Road, Nottingham, N.H. W1NQ.

FOR SALE: LW-51 6-Meter Transmitter, $45; Power Supply to Transmitter, $30; National 6- and 2-Meter VFO, $32; Tecraft Converter for 6 meters I.F. 14 to 18 Mc. with Power Supply, $33; Lafayette HE-45 with Halo, $85. Dick Mehner, W2PQU, 17 West Delaware Avenue, Pennington, N.J.

WANTED: Heathkit SB-10 SSB adapter. Will pay price plus shipping. K6BBJ, 1851—43rd Avenue, San Francisco 22, Calif.

FOR SALE: Seneca $170; SX99 $80; HB Six Meter Converter 115AC $15; 50W CW XMTR, relay $28; instructograph $30. Works $300. K9TMQ.

COLLINS SACRIFICE 75A3—32V2 good condition. V2 converted pair 6146. BEST OFFER F.O.B. F. L. Webb, W4AAH, Box 845, Collinsville, Virginia.

SIX METER TRANSCEIVER: Runs ten watts a.m. or c.w.; extremely neat construction; includes a.c. power supply, dynamotor, new Saturn halo dipole, mike crystals, all coax & cables; send stamp for details, $65 f.o.b., K8PBZ, 2259 Galeta Avenue, Youngstown 4, Ohio.

Precise 116 fast Mutual Conductance Tube Tester with CRT adapter $65; Portable typewriter, $10; UTC PVM-3 Modulation Transformer, unused, $10; GE Model 250 portable radio, self-charging, metal cabinet $7.50. "Ted" Hein, 418 Gregory, Rockford, Illinois.

HAMFESTER RADIO CLUB's 28th Annual Hamfest to be held Sunday, August 12, 1962 at Santa Fe Park near Chicago. Write Larry Finnan, K9EEC, Picnic Chairman, at 1209 W. 74th St., Chicago 36, Illinois for further information.

SELL CONVERTER 6mtr $10. Tubes New 4CX300A $10; 2C39, 4-65A, 4X150A, $5, Receiving Tubes. W7POS, 2319 East Indianola, Phoenix 16, Arizona.

WANTED—3-12B4, 516F2. Also consider late 32S1 if appropriately priced. Prompt replies all proposals. Serial, price, condition first letter. W6CLY/9, 2249 S12 St., Springfield, Ill.

TRAVEL ABROAD COSTS LESS, is lots more fun when arranged by THE INTERNATIONAL HAM-HOP CLUB. Non-profit, non-political. Members in 50 countries. Inquire U.S.—W8SZF, 3075 Scarborough Rd., Cleveland 18, Ohio; Canada . . . VE3XF, 41 Kildonan Dr., Scarborough, Ontario, Ca.; Mexico . . . XE1Z, Michoacan 126-202, Mexico City, 11, DF, Mexico.

KWS-1, $865; KWM-1, $450; 75S-1 with noise blanker, $435; 75A-1, $215; 75A12, $265, 20A, $135; 600L, $300; LA400-C, $145. W8WGA.

WANTED: Any or all of the following CQ's; Jan. thru Oct. 1945; Feb. 1946, Oct. Nov. 1947. W2ELW, 71 Southampton Dr., Levittown, N.J.

SELL: SX101 MK3, like new—$230; Fisher 101-R Stereo tuner—$125; Bell 3030 Stereo preamp and amp—$90; Roberts Stereo 4 track record and playback, with amps —$250; Tungsol 6550 tubes—2 for $8 (have no use), 600 D mike $5—Lamb, 527 Rutherford Avenue, Trenton, N.J.

FOR SALE: Gonset G-76 with 12V pwr supply and electrovoice mike: $400. Mosley TM5 all-band mobile antenna $50. W7YHS, 319 No. 26 St., Billings, Montana.

MOBILE STATION. Gonset G66B and G77A. Center loaded Master Mobile antenna with 900 Aristocrat Coil, heavy duty bumper mount, and Micro-Z Match. Cabeling for mobile and fixed use. Shure 505C mike. Factory cartons and manuals. All excellent condition. $345. K3JHX, 109 Spring Valley Rd., Wilmington 7, Delaware.

SELL OR TRADE HT32A and SX101A MK III Want Tektronix Scope and General Radio Signal Generator. W41WA, 105 Lynnhaven, Hampton, Va.

MUST SELL: Gonset Communicator II for 6 mtrs, Mint Condx, with accessories $110; Mosley 3 EL 20 Mtr Minibeam, New $30; Collection of transistors 10 for $1. Send stamp for complete list of items. H. S. Kofsky, 201 Eastern Pkway, Brooklyn 38, N.Y.

WANT FOR CASH:—CQ All 1945 issues; VANTRON Q-Probe; sell or swap QSTs 1930-1959. W4ID 461-3rd Ave., Sea Park, Eau Gallie, Florida.

ALTERNATORS, new, 12V, complete with universal installation kit and transistor regulator. Fully guaranteed. Write for details. 30A unit $49.95, 45A $9.95. Electrocom Corp., 115 Ward Street, Boston 20, Mass.

---

6 & 2 METER FM gear. Surplus police units. Receiver strips $15. Transmitter strips $10. Write for details. Two-Way Radio, 115 Ward Street, Boston 20, Mass.

LONG YAGIS for 50 thru 432. Send for free catalog. Wegner Bros., Dept. C., Bridgeport, Michigan.

WANTED: Teletype printers, perforators, reperforators, transmitter-distributors test equipment; Model #14, #15, $19, #26, #28, etc. All types Collins receivers, 51J, R-388, $380, 75A-4, $525.00, etc. Cash or trade for NEW amateur equipment. Write Tom, W1AFN, Altronics-Howard Co., Box 19, Boston 1, Mass. (Richmond 2-0048)

SELL: 178 issues QST 1939 thru 1960. From Sept. 1946 thru Dec. 1960 complete. Offer? W2EQS.

BETTER HAM GEAR for LESS. Samples: Valiant, $259.95; Pacemaker $239.95; DX-100, $109.95; Globe Scout, $39.95. Send for list. CASH FOR YOUR GEAR, We Buy, Sell and Trade. H & H Electronic Supply, 506 Kishwaukee St., Rockford, Illinois.

APACHE OWNERS: Increase power by 50%. Run 240 watts AM—300 watts CW or SSB. Complete kit and instructions for adding another 6146 to final only $19.95. Similar kit for DX-100. Order or write. W4KUV, BEST RADIO SERVICE, 610 N. Madison Avenue, Goldsboro, N.C.

WANTED: SURPLUS RECEIVERS, TRANSMITTERS, BC-348, R-390/URR, AN/GRC-3 to 10, AN/PRC-6 to 10, SB-22/PT, SB-86/P AN/TCC-3, AN/TCC-7, AN/TRC-24, other signal corps equipment Surmer, Box 4118, Jersey City, N.J.

TRADE my radio parts for your stamps, books on World War I Flying, or cash. Send for list. Mocabee, 2065 Eileen Dr., Anaheim, Calif.

Antenna, vertical, all bands, no traps, telescopes from 10 to 28 feet, self supporting, Complete with mounting hardware, bronze capacity hat, instructions and loading coil. See it on the cover September 1961 "CQ" Radio Amateur's Journal. $11. Wt. 10 lbs. W6WFR, 199 Random, Pleasanthill, Calif.

FOR SALE—TR-2 rotator, indicator $15. Panadapter SP-44 $25. Heath TV-FM align gen TS-4A $25. 2-813 fil xmfrs 10vct at 10a $5. Micro match swr ind $15. Gonset police converter 150-162 mcs, audio amp & pwr supply home or mobile use $35. Carter dyn 61/470vdc 260 ma with starting relay $9. Gothard dyn 12v/400 vdc 175 ma. $5. Century self service tube checker SS-1 new, never used $90. B&W inductor sets HDVL, TVL, JEL, variable xmtr condensers Johnson, National and Cardwell. W2UGM Dick Marsino, 66 Columbus Ave., Closter, N.J. PO 8-1884.

WANTED: Commercial or Surplus Airborne, ground transmitters, receivers, testsets, 18S, 17L, 51R, 618S. HC611, BC1000, GRC, PRC, ARN 14, RT77/GRR, Bendix, Collins, others . . . RITCO, Box 156, Annandale, Virginia.

FOR SALE: Collins 51-S-1 receiver (same coverage as 51J4) to the highest bidder, will accept other commercial gear as part pay on this brand-new item. M. E. Smith, K8GDR, 5760 N. High Street, Worthington, Ohio. Tel. TU 5-6886 after 0200 GMT.

CANADIANS! Hallicrafter HT 30 side band Exciter—top condition—used under 10 hrs. Price: $325. F. T. Gaspard—143 Smith St., Winnipeg 1, Ca.

SELL: HRO 60 with all coils—$225. Gonset III Communicator 2 meter like new—$175. W6OXB, RT. 2 Box 973, Modesto, Calif.

HRO-7: 80, 40, 20, 15, 10 Bandspread coils, speaker, power supply, xtal cal. $75.00, W2JB, TR4-0614, 173 W. 78th St., N.Y. 24, N.Y. Locals.

MOBILE TRANSISTOR POWER SUPPLY TRANSFORMERS. 120 watt, $5.95. 50 Watt, $3.95. 35 watt, $2.95. POSTPAID. ALL NECESSARY INFORMATION FURNISHED. C. F. GRICE, 13114 INDIAN CREEK, HOUSTON 24, TEXAS.

NEW

Government surplus transmitters type TAJ-19, made by GE, 175 to 600 kc. 500 watts CW, 250 watts MCW. Complete with tubes, Less power supply . . . . . Price $150.00

ACE SURPLUS CO.

307 Canal Street, New York 13

CAnal 6-6467

ALL BAND TRAP ANTENNA !

Reduces interference and Noise on All Makes Short Wave Receivers. Makes World Wide Reception Stronger, Clearer on All Bands!

For ALL Amateur Transmitters. Guaranteed for 500 Watts Power for Pi-Net or Link Direct Feed. Light, Neat, Weatherproof

Complete as shown total length 102 ft. with 87 ft. of 72 ohm balanced feedline, Hi-impact molded resonant traps. (Wt. 3 oz. 1"x 5" long). *You just tune to desired band* for beamlike results. Excellent for ALL world-wide short-wave receivers and amateur transmitters. For NOVICE AND ALL CLASS AMATEURS! NO EXTRA TUNERS OR GADGETS NEEDED! Eliminates 5 separate antennas with excellent performance guaranteed. Use as inverted V for all band power gain. NO HAYWIRE HOUSE APPEARANCE! EASY INSTALLATION!

80-40-20-15-10 meter bands. Complete $14.95
40-20-15-10 meter bands. 54-ft. ant. (best for w-w swl's 13.95
20-15-10 meter bands. Dual Trap. 24-ft. antenna 19.95

SEND ONLY $3.00 (cash, ck., mo) and pay postman balance COD plus postage on arrival or send full price for postpaid delivery

Free information available only from:

WESTERN RADIO • Dept. AC-8 • Kearney, Nebraska

REMOTE CONTROL ANTENNA SWITCH

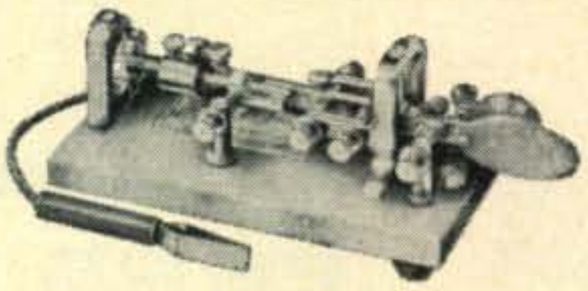
Get rid of a lot of unnecessary Co-ax cable. Feed four separate antennas with a single feed line. For complete description see article by W5BGP in March '62 *CQ*—Price $47.50, F.O.B.

MORAL SWITCHES

945 W. Houston St., Sherman, Texas

MAKES SENDING A PLEASURE

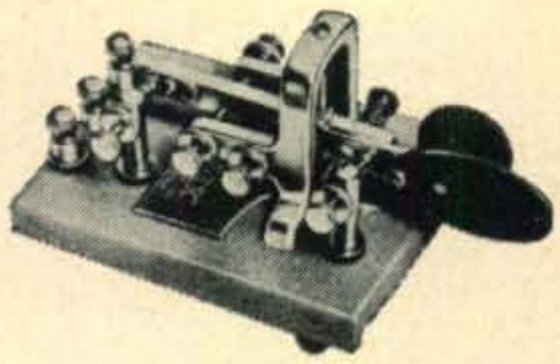
With **VIBROPLEX**



No special skill required. Just press the lever — Vibroplex DOES THE REST. All parts precision machined and key is adjustable to any speed. Will not tire the arm. Five models, priced at $17.95 to $33.95.

VIBRO-KEYER

In building electronic transmitting units, Vibro - Keyer supplies the perfect part. With a finely polished base 3½" by 4½" and a weight of 2¾ lbs. Has same contacts and finely finished Vibroplex parts. Standard, at $17.95: DeLuxe, with Chrome Plated Base, priced at $22.45.



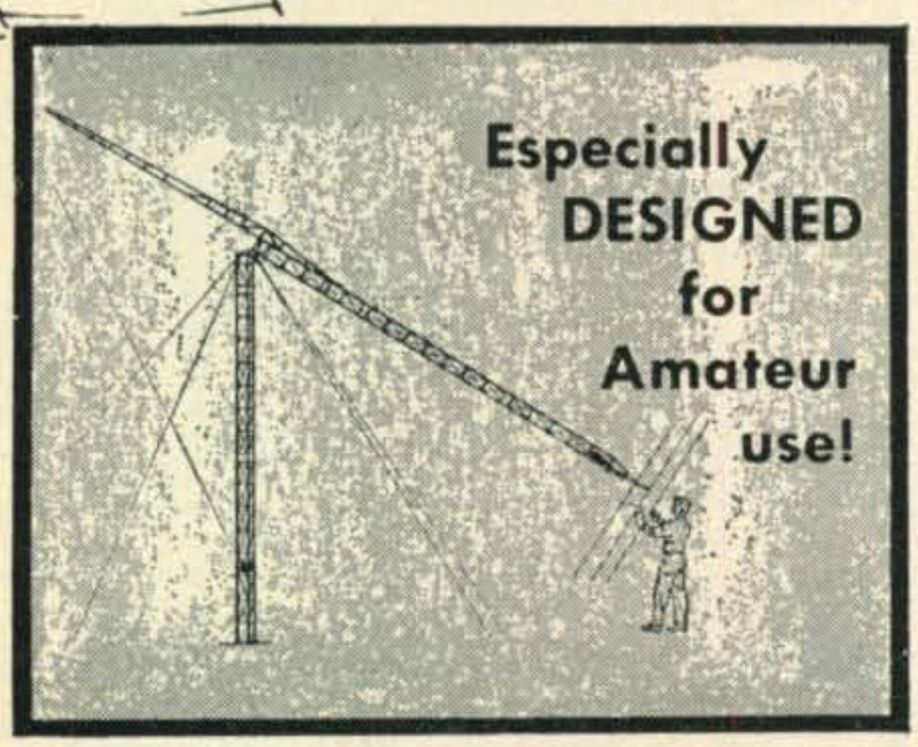
Order today at your dealers or direct.

THE VIBROPLEX CO., INC.

833 Broadway New York 3, N. Y.

FREE Folder

ROHN "fold-over" TOWERS*



first IN DESIGN *foremost* IN SALES

ROHN "fold-over" towers are ESPECIALLY made for amateur use. They are the most practical tower in design because they allow you to work ON THE GROUND for antenna maintenance and servicing. You'll quickly agree that this is a most wonderful feature for an amateur tower. In addition, these towers are made and designed for true, heavy duty use. They are structurally sturdy for use up to 70 feet and in enough sizes for *all* types and sizes of amateur antennae. This means that they can easily handle your requirements. They have unexcelled workmanship. They are hot-dipped galvanized after fabrication which means you have no problem of maintenance. They come as a complete package with all materials and accessories included. Add all these wonderful features together and you see why they're the most demanded tower today! Priced from $186.

FREE literature and near source of supply gladly sent.
Be Sure you investigate ROHN towers before buying!

*Patent—2,875,865

ROHN *Manufacturing Company*
Box 2000 • Peoria, Illinois

"World's largest exclusive manufacturer of TV-Communication towers"

For further information, check number 40, on page 126

FOR SALE: Collins, 75A-1 Receiver, used very little. Offer? Wm. J. Ziegler, Jr., 357 Levick St., Philadelphia 11, Pa.

WANTED: Dow-Key 115v. Relay. K1IIK.
ARMY RESERVIST SACRIFICING 1959 75A-4. Excellent Condition. B-Filter. $450. W4AFS.

COLLINS mechanical filters; several available .500, 455, 300 and 250 kc. Write for list. Will sell or swap for other filters I need. W8MGQ, 1010 Burnham, Bloomfield Hills, Mich.

SELL: Gonset G-76 Transceiver with xtal calibrator and 12v DC Power supply. Used less than 20 hours. Like new $450. Bunge, Box 9841, SUPO Tucson, Ariz.

No time to operate—sell for cash. Complete 2 kw pep station. 75S1, 32S1, 516F2 ac, SM-1 mike, Collins. Less than a year old .4-1000A GG 80-10 table top amplifier with the latest cathode tuning. 3500v 500ma power supply. High quality throughout. C E MM-2 scope, HD-11 Q-Mult, Pennchron 24 hr. clock, WRL Comet desk. Picture on request. Pick up at my QTH for $1200. Ike Lee, W4EXP, Rt. 1, Box 623, Orange Park, Florida.

Going to college. Must sell my HRO-60T. Very fine condx —$300. Also selling ACC. E, F, G, H, J AD coil drawers —$25. Will consider any reasonable offer for any or all. All letters answered. Chris, WA6HTJ, 2515 No. Vermont, L.A. 27, Calif.

SALE: HALLICRAFTER's S-38E. Good Cond. $35. A3C Thompson, Lee F. AF 12652768 Mail Room 2, Box 917, Chanute AFB., Ill.

HEATH GC-1A transistorized comm. rcvr. with a-c & battery power supplies: $85. K2BUS, 238-73 116 Rd., Elmont, L.I., CU 5-8589.

RTTY converter, radio frequency lab model 146 cost $310 will sell for $200 new original carton & instructions. RTTU shift keyer & converter, northern radio type 164 model 3 cost $700 will sell for $500 new crated—WØNHP. R. E. Mann, 7205 Center Dr., DesMoines, Iowa.

TV CAMERA—low cost—easily built—complete schematics, instructions 50¢. Denson Electronics, Rockville, Conn.

VIKING INVADER $400, FOB. Used very little in second station. 75A-1 with Collins $23 vernier dial, matching speaker, Make offer. J. Jones, Box 101, Bicksburg, Mississippi.

SELL. GONSET COMMUNICATOR II, 2M., 12v/110v, A-1 condx. Gonset Super 6 Converter, 12v, never used. Powercon converter, 12v dc to 110v ac, 100 watts continuous, like new. Will sell separately. QST's 1952 thru 1961; CQ's 1954, 1956 thru 1961; will sell any year. Best offer by Sept. 1 takes. R. E. Holte, W8MBZ, 1920 Bond, Niles, Michigan.

WANTED: Old wireless gear, tubes, magazines and catalogs before 1925. Amateur or ship equipment only. Please give complete information including price. My purpose is to buy this equipment, put it in first class shape and make it available either on a museum or demonstation basis to all amateurs who didn't live and operate during this era. W5VA, T. Frank Smith, P.O. Box 840, Corpus Christi, Texas.

COAXIAL RELAY, ideal for mobile CB and ham transceivers. BNC connectors for antenna and receiver, lug for transmitter. Coil for 6 VDC or 12 VDC with resistor supplied. Government surplus, Bargain: $8.00 ea., 3 for $20.000 post paid. ELECTRONIC LABORATORY SUPPLY CO., 7208 Germantown, Philadelphia 19, Penna.

WANTED: Commercial or Surplus Airborn, ground, transmitters, receivers Testsets, 18S, 17L, 51R, 618S, BC611, BC10000, PRC, ARN14, GRC, Bendix, Collins, Others . . . RITCO, Box 156, Annandale, Virginia.

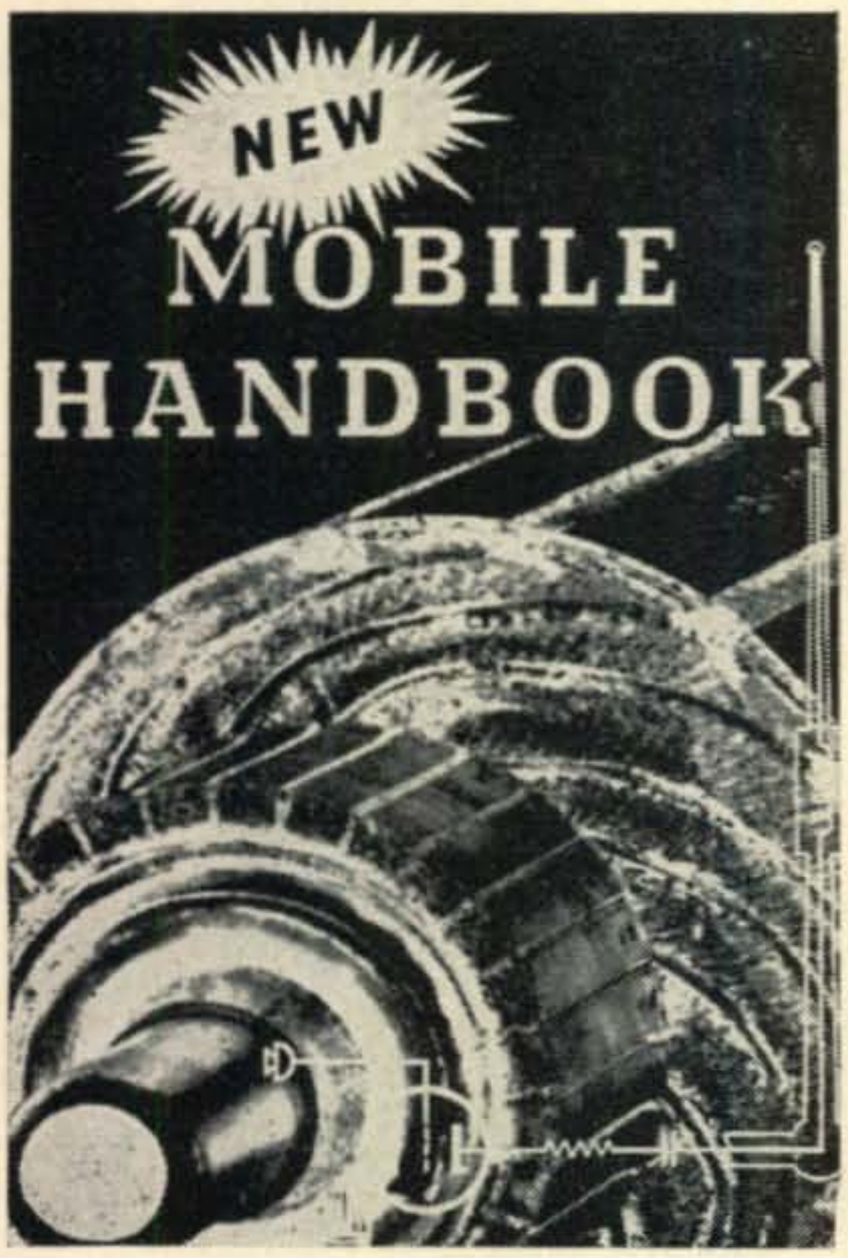
RECONDITIONED! TERMS! (24 months!) TRIALS! TRADES! WRITE FOR FREE LIST: Collins 75A-3—$379.00 75A-4;—599.50; 75S-1—$379.00; 32V-3—$375.00; 32S-1—$479.50; KWM-1—$499.50; 30S-1—$999.50; Transcon 6—$49.00; Chief Dlx.—$57.50; Gonset G66B—$119.00; G77, complete—$179.50; Commander mobile—$79.00; G28—$129.50; 3275 6M 12V converter—$39.95; Hallicrafters SX-88—$349.00; SX-100—$199.95; SR-34AC—$199.50; HT-37—$375.00; Hammarlund HQ-170—$274.50; Johnson Valiant—$329.00; Thunderbolt—$399.50; Challenger—$99.50; std. 250 Matchbox—$39.50; Morrow Falcon—$79.95; Elmac AF-67—$114.95; National HRO-60T—$299.50; NC-270—$199.00; HFS 27 to 250 mc—$79.50; WRL SS-3—$11.95; TC-6—$39.50. World Radio Laboratories, Box 919, Council Bluffs, Iowa.

FREE!
FROM BILL BRURING
W9ZSO

64 PAGE AMATEUR CATALOG
NEWEST NAME BRAND GEAR

Communication Equipment Co.
518 STATE ST.
LA CROSSE, WISC.
PHONE 4-7373

"NEW MOBILE HANDBOOK"



Anyone who tries to go mobile without getting this book, should register for a sanity hearing. Bill Orr, W6SAI has put everything you need to know in this book. Build-its by the dozen . . . solutions to ignition problems, keeping the battery charged, noise . . . only $2.95 postpaid.

CQ Magazine
300 WEST 43rd STREET CQ8
New York 36, N. Y.

SIRS: My check (money order) for $_____ is enclosed. Please send _____ copies of the "New Mobile Handbook."

Name_____

Address_____

City_____Zone_____State_____

New York City Residents Add 3% Sales Tax

BARRY Electronics

Capacitor Sale:
800 Mfd./150 VDC. **$1.00;** 1500 Mfd./80 VDC. **$1.00;** 2500 Mfd./80 VDC. **$1.00;** 3000 Mfd./40 VDC. **$1.00;** . . . ten for **$9.00;** 4000 Mfd./50 W.V./50 W.V. **$1.25** (ten for **$11.00**); 8000 Mfd./55 M.W.V. (65 V. Peak) **$2.95** (ten for **$25.00**)
U.T.C. Swinging Choke: 10 Hy. @ 63 Ma./35 Hy. @ 12 Ma. Herm. Sld. Orig. box. UTC#F3605. **$1.00**
General Electric Plate Transformer: Pri: 100, 105, 115, 200, 210 or 230 VAC @ 60 CPS. Sec: 3525 VAC @ 2 KVA. Use a pair of these transformers to get 7050 VCT @ 800 Ma. Each transformer has a net wt. of 40 lbs. Overall dimen. 4½"H x 5¼"D x 10¾"W. **$19.95** each (two for **$38.00**). (Orig. sealed G.E. ctn.).
800 Ma. Filter Choke Acme: 2.5 Hys. @ 800 Ma. 8 KV insulation. Herm sld. **$5.75**
RCA 4X150A Tube (new JAN stock). **$12.50**
Electronic Regulated Power Supply: In: 115 VAC 60 CPS. Out: 250 to 300 VDC @ 100 to 125 Ma. Hi Volt Intermit. 1600 V. supply. **$15.00**
50 Ft. of 8 Conductor Rubber-Covered (Color Coded) Hi-Quality Cable. **$2.50**
New Lot of Brand New "Mint" Condition **EIMAC** 4-1000-A tubes @ **$95.00**
4-1000A Sockets @ **$12.00**
Teletype Model 255A Polar Relays **$4.95**
Jennings Vacuum Variable Capacitor type UCSVH: 8 Mmfd. thru 35 Mmfd @ 25 KV. brand new boxed **$59.00**
Jennings Vacuum Variable Capacitor type T: 15 Mmfd. thru 35 Mmfd. **$39.00**
Hi-Voltage Converters: Miniature Chopper type Voltage converter. 3 oz. 1 to 3 V. input. Output: 6000 V. AC. DC. when rectified. Model 10MVT. **$10.00.**
Hi-Voltage Converters: In: 115 VAC 60 CPS. Out: 18 KV Peak Pulse. Model 18VT **$35.00**
Victoreen Model 61720/Fallout Detection Meter. Brand new, complete with Battery Ranges 0-5, 50, and 500 Roentgens per hr. **$44.00** with instructions.
Westinghouse Power Silicon Rectifier Type 1N1291/322A: Each rectifier rated at 160 Amps @ 50 PIV. Assembly consists of a pair of 1N1291's mounted on heat sink with a pair of "Surge" 1N1199/304A's. **$22.00.**
Same as above less pair of 1N1199/304A's—**$20.00.**
Plate Transformer: Operates from 115 or 230 VAC @ 50-60 CPS. Sec: 3750-0-3750 VAC. Tested at 250 Ma. Oil-filled. 11"H x 7¼"W x 5¼"D. 38 lbs. Net. Packed two to the wooden original case (70 lbs). **$35.00** each (two for **$65.00**). The current is incorrectly stenciled on this transformer—however unit thoroughly tested and guaranteed for 250 Ma.
IN STOCK: NEWTRONICS DELUXE LINE OF MOBILE "HUSTLER" ANTENNAS.
Silicon Rectifiers: 750 Ma. latest epoxy resin, bullet type subminiature rectifiers. Similar to 1N2069 (200 PIV) @ **28¢** each; 1N2070 (400 PIV) @ **32¢** each; 1N2071 (600 PIV) @ **36¢** each W5DX says: "By using 10 of the silicons in a leg of a full wave hook-up, I replaced a pair of 866A's (with a 10 ohm, 20 watt resistor in each leg) I did away with a fixed choke, a filament xfmr & the 2 rectifier sockets. Gained 600 V. & ran stone cold."
ONE OF THE LARGEST STOCK OF ELECTRONIC TUBES IN THE COUNTRY. SEND FOR QUOTE ON TYPES NEEDED. BUY YOUR RME 6900 RECEIVER FROM US (WE ARE INTERESTED IN SWAPPING FOR TUBES AND EQUIPMENT OR WRITE FOR SALE PRICE)
COME IN SATURDAYS from 10AM to 2 P.M. FREE PARKING ON SATURDAYS.

BARRY ELECTRONICS CORP. Dept. C-8
512 BROADWAY, NEW YORK 12, N. Y.
WALKER 5-7000 AREA CODE: 212

☐ Enclosed is money order or check and my order. Prices FOB, NYC. Shipments over 20 lbs. will be shipped colect for shipping charges. Less than 20 lbs. include sufficient postage. Any overage will be refunded.
☐ Send copy of summer "Green Sheet" Catalog.
☐ Send information on:.....
☐ I have available for trade-in the following.....

.....

Name .....Title
Company .....
Address .....
City .....State.....

For further information, check number 41, on page 126

BACK ISSUES FOR SALE $1.00 per copy

1950—Jan., July, Oct.
1951—All issues, except Nov.
1952—All issues, except June, Aug.
1953—All issues, except May, July, Dec.
1954—All issues, except Feb.
1955—All issues, except Nov.
1956—All issues, except April
1957—All issues, except Jan., Feb., May, and Nov.
1958—All issues, except Jan., June, July, Sept., Oct.
1959—All issues except Jan. and June
1960—All issues except May
1961—All issues
1962—All issues except Jan.

BC-603 Conversion article (Sept. & Oct., 1958 CQ)
Reprints available at 50¢ per set.

CQ Magazine
300 West 43rd St., New York 36, N. Y.

For further information, check number 57, on page 126

READER SERVICE

CQ Magazine, Dept. RS

300 WEST 43rd STREET
New York 36, N. Y.

Coupon H
Void after
Aug. 25, 1962

Please send me more information on your ads in the Aug. 1962 *CQ* keyed as follows:

1	2	3	4	5	6	7	8	9	10	A
11	12	13	14	15	16	17	18	19	20	B
21	22	23	24	25	26	27	28	29	30	C
31	32	33	34	35	36	37	38	39	40	D
41	42	43	44	45	46	47	48	49	50	E
51	52	53	54	55	56	57	58	59	60	

Total Inquiries ☐

NAME_____
(Please Print)

Type of work (specify)_____

ADDRESS_____

CITY_____

ZONE____ STATE_____

CQ ADVERTISER'S INDEX

Ace Surplus Company, Incorporated 123
Allied Radio Corporation 128
Alltronics-Howard Company 121
Amateur Electronic Supply 107, 111, 115, 116, 119, 120, 122

Barry Electronics Corporation 125
Best Radio Service 116

C & G Electronics Company 117
Centralab 14
Century 17
Cleveland Institute of Electronics 19
Collins Radio Company ..... Cover II
Communications Equipment Company 124
Cowan Publishing Corp.
- CQ—Back Issue 126
- CQ—Change of Address 121
- CQ—Ham Mart 112
- CQ—Ham Shop 120
- CQ—Reader Service Card 126
- CQ—Subscription 117
- CQ—USA/CA Record Book 109

E-Z Way Towers, Incorporated 122
EICO 13

Fair Radio Sales 114
Finney Company, The 16

Gonset Company 6
Gotham 101
Graham Radio, Inc. 114
Greenlee Tool Company 118

Hallicrafters Company 4, 5
Hammarlund Manufacturing Company 10
Harvey Radio Company, Incorporated 103
Heath Company 24, 25
Hornet 127
Hy-Gain Antenna Products 11

Instructograph Company 121
International Crystal Manufacturing Co. 2

Johnson, E. F. Company 15

Lafayette Radio 105
Lampkin Laboratories, Incorporated 121

Millen, James Mfg. Co. Inc. 12
Moral Switches 123
Mosley Electronics, Inc. 8, 9

National Radio Company, Incorporated ..... Cover III
New-Tronics Corp. 22

P & H Electronics 114
Pennwood Numechron Co. 116
Penta Laboratories, Incorporated 23
Petersen Radio Co. Inc. 1

Radio Amateur Call Book 114
RCA (Electron Tube Division) ..... Cover IV
Rohn Manufacturing Company 124

S.E.G. Sales 110

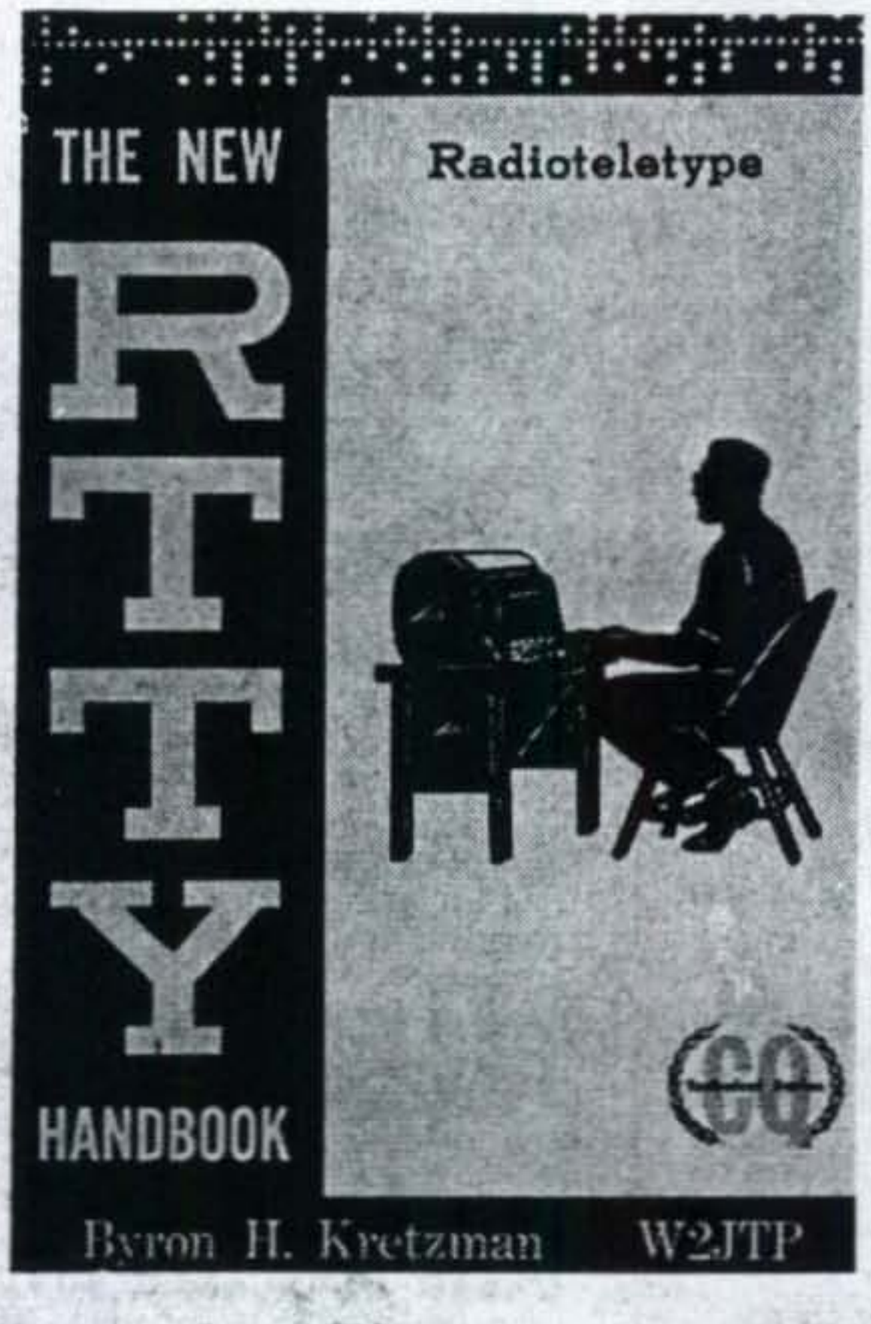
Telrex. Laboratories 117
Texas Crystals 20

U. S. Crystals, Inc. 118

Vibroplex Co. Inc 123

Waters Manufacturing, Inc. 18
Western Radio Co. 123
World Radio Labs Inc. 21

"THE NEW RTTY HANDBOOK"



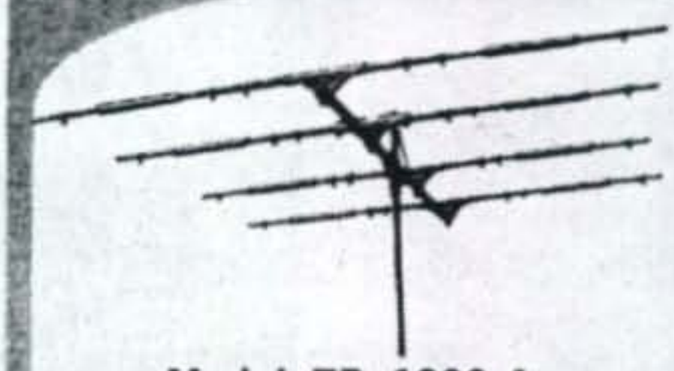
A treasury of vital and "hard to get" information. Loaded with equipment schematics, adjustment procedures, operating procedures, etc. A valuable asset to both the beginning and the experienced RTTY'er. Special section on getting started, all written by *Byron Kretzman, W2JTP*, a well known authority in the field. This book is a must for your library! Only *$3.95.*

CQ Magazine
300 WEST 43rd STREET
New York 36, N. Y.

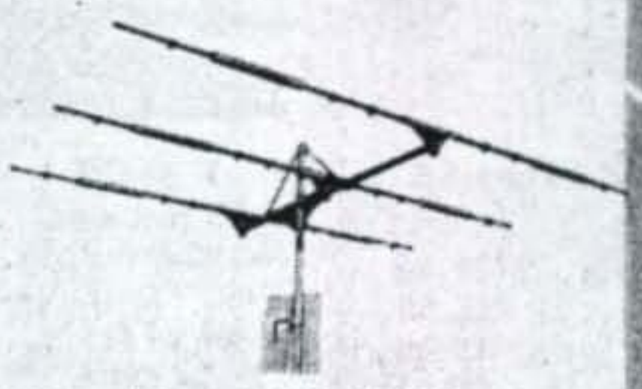
CQ8

SIRS: My check (money order) for

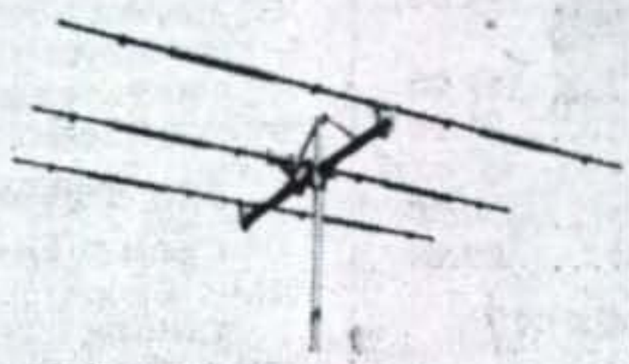
Amateur/CB/ or industrial —
You can't go wrong with HORNET.



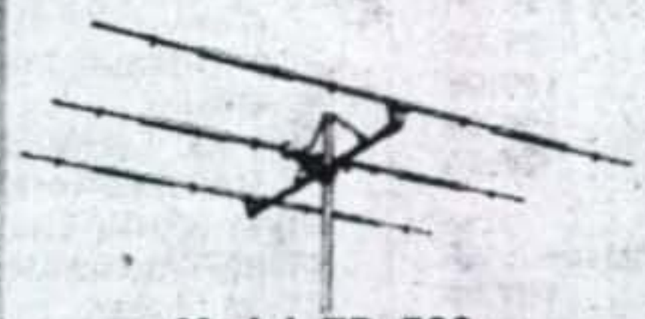
Model TB 1000-4
Cash Price **$112.50**
Only **$10.50** per month



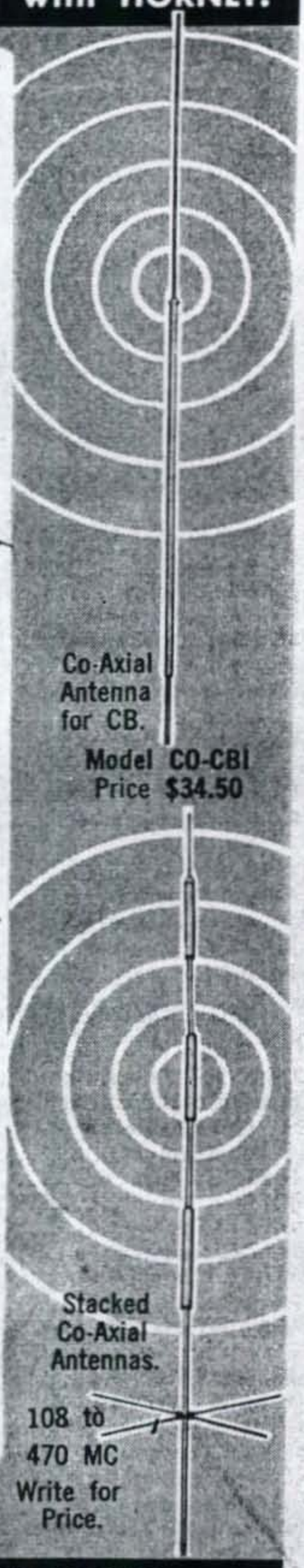
Model TB 1000
Cash Price **$89.75**
Only **$8.35** per month



Model TB 750
Cash Price **$67.50**
Only **$6.30** per month



Model TB 500
Cash Price **$55.95**
Only **$5.20** per month



Co-Axial Antenna for CB.
Model CO-CBI
Price **$34.50**

Stacked Co-Axial Antennas.
108 to 470 MC
Write for Price.

MAIL YOUR ORDER TODAY

NET ANTENNA PRODUCTS CO., INC.
808, DUNCAN, OKLAHOMA

rush the Hornet Antenna indicated below for a 10-day
If not satisfied, I agree to return the antenna prepaid
10 days without obligation.

I prefer shipment to be c.o.d. 25% is inclosed.
Payment in full is inclosed.
I wish to use your Time Payment Plan.

del	Description	Price

_____ Call Letters _____

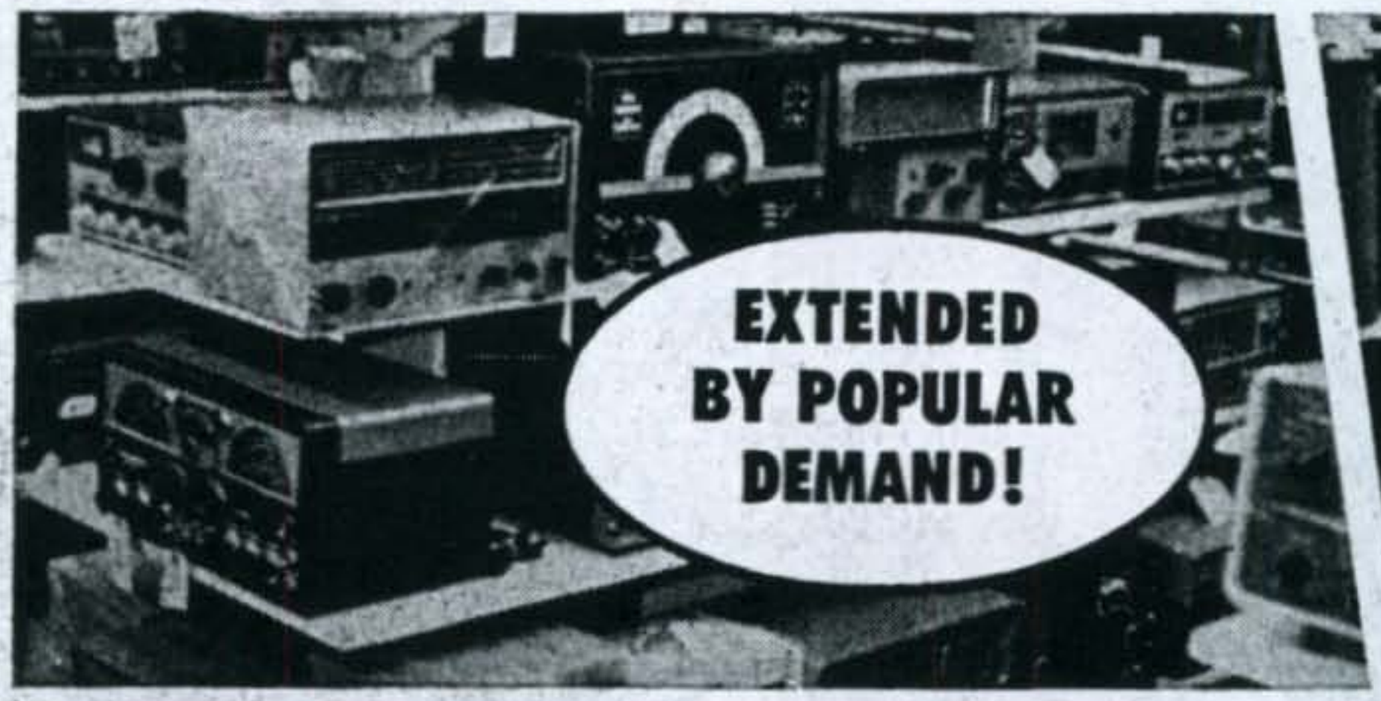
_____

_____ State _____

SATISFACTION GUARANTEED

rther information, check number 42, on page 126

SMASHING VALUE ALLIED RECONDITIONED EQUIPMENT SALE!



MOBILE EQUIPMENT SPECIALS

Gonset	
G-66B Receiver	$129.50
G-77A Transmitter	169.00
3175 6-Meter Converter	49.00
Super-6 Converter	29.00
Commander Transmitter	49.00
Eico	
720 Transmitter	69.00
Heath	
Cheyenne Transmitter	89.00
Comanche Receiver	99.00
Morrow	
560A Transmitter	119.00
Falcon Receiver	89.00
Multi Products	
AF-67 Transmitter	99.00
PMR-7 Receiver	89.00

NOVICE/SWL BARGAINS

Globe	
Chief 90A Transmitter	44.95
Scout Deluxe Transmitter	124.00
Hallicrafters	
S-20R Receiver	25.00
S-85 Receiver	79.00
SX-99 Receiver	99.00
SX-110 Receiver	109.00
SX-140 Receiver	99.50
HT-40 Transmitter	74.00
Hammarlund	
HQ-105TR (comb. SW Receiver and CB Transceiver)	189.00
HQ-140X Receiver	149.00
HQ-129X Receiver	119.00
Heath	
DX-35 Transmitter	35.00
DX-40 Transmitter	45.00
Johnson	
Adventurer Transmitter	29.00
Ranger I Transmitter	179.00
Knight	
R-55 Receiver	$ 59.00
R-100 Receiver	79.00
T-60 Transmitter	49.95
V-44 VFO	19.95
Lettine	
240 Transmitter	39.00
Millen	
50-Watt Transmitter (w/pwr supply built-in)	29.00
National	
NC-88 Receiver	89.00
NC-109 Receiver	109.00
NC-188 Receiver	89.00
NC-190 Receiver	189.00
NC-270 Receiver	189.00

SSB EQUIPMENT VALUES

Central Electronics	
MM-1 Scope	69.95
Collins	
30S-1 KW Linear	995.00
32S-1 Transmitter	449.00
75S-1 Receiver	395.00
KWS-1 Transmitter	895.00
Drake	
2A Receiver	229.00
Gonset	
G-28 10-Meter Transceiver	159.00
Globe	
DSB-100 Transmitter	89.00
Hallicrafters	
HT-31 500-W Linear	99.00
HT-32 Transmitter	350.00
HT-33 Linear	289.00
SX-100 Receiver	179.00
SX-101 MK1A Receiver	199.00
SX-101A Receiver	289.00
Heath	
SB-10 SSB Generator	79.00
Hammarlund	
HX-500 SSB Transmitter	479.00
HQ-170 Receiver	259.00

VHF EQUIPMENT

Gonset	
Communicator IV 6-Mtr.	$289.00
Communicator III 6-Mtr.	179.00
Heath	
Seneca (6 & 2 Meter) Xmtr.	169.00
Lincoln	
6 Meter Transceiver	39.00
RME	
VHF-126 1¼, 2 & 6 Mtr. Converter	179.00
Hallicrafters	
S-95, 152-174 mc FM Receiver	49.00
SR-34, 6 & 2 Mtr. Transceiver Universal Model	299.00

OTHER USED GEAR SPECIALS

Collins	
310B Exciter/Transmitter	99.00
32V-1 Transmitter	189.00
Eico	
730 Modulator	49.00
Hallicrafters	
SX-42 Receiver	129.00
SX-71 Receiver	119.00
SX-96 Receiver	129.00
Hammarlund	
SP-400 Super-Pro Receiver	165.00
HQ-160 Receiver	239.00
Johnson	
KW Matchbox (standard model)	89.00
Valiant I Transmitter	289.00
National	
HRO-60	369.00
RDF-66 Direction Finder	12.95
RME	
HF-10/20 Converter	39.00
4300 Receiver	119.00
4350 Receiver	129.00
Sonar	
SRT-120 100 W. Phone & CW Transmitter	95.00

NO MONEY DOWN

Allied's Credit Fund gives you bigger buying power—up to 24 months to pay.

90-DAY WARRANTY

Allied reconditioned equipment is covered by the full 90-day new gear warranty.

SALE ENDS SEPT. 15!

Quantities Limited—
Order today—use the coupon.

ALLIED RADIO

For further informati

The National NC-303 is not for every amateur...

Frankly, the NC-303 is an expensive receiver. And not every ham is willing to spend $449 to enjoy the maximum in receiving convenience and performance. The NC-303 is not a "compact" light weight. It's packed with 78 pounds of husky components to provide a little bit better reliability and performance than the next receiver. The NC-303 offers certain advantages. Sensitivity, for example, is an honest 1.0 microvolt or better for 10 db AM signal-to-noise ratio (this is not a misleading CW measurement or one based on a 6 db S/N), and the NC-303 is quiet — no operator fatigue from background noise bursts.

Selectivity is remarkable (six tuned circuits at 80 KC result in extremely steep skirts on SSB and CW) . and the '303 offers the widest selectivity range available on any hamband receiver — 400 cycles through 8 KC. Stability, both mechanical and electrical, is quite out of the ordinary. No need to tip-toe around the shack. In fact, tune a CW signal and employ the classic "drop test" to see for yourself. Incidentally, we consider 100 cycle thermal drift after a short warm-up to be unusual.

"This is all very well", you may say, "but not a great deal better than competitive receivers" We agree — for four hundred and fifty dollars you should expect much more than this, and so we give more to you. The most expensive dial drive in the industry to provide smoother inertia tuning than any receiver on the market, regardless of price. The NC-303's band switch mechanism even employs a Geneva movement . . . you just start it on its way . . . it does the rest of the job by itself. No wiggling back and forth to make sure every contact is engaged. This switch snaps in with a satisfying clunk and stays there. (Try tuning a signal on one band, then flip to another band and back again.)

Other extras include complete coverage from 160 (by the way, the '303 is the only SSB hamband receiver now on the market which incorporates 160) through 1¼ meters with separate 12" slide rule drum dials for each band, and accessory converters are available for the three VHF bands. Even a separate converter input is provided. Dial calibration is to 1 KC on the lowest band, to 2 KC through 15 meters.

The '303 also offers the best SSB AVC you've ever heard. No pops, thumps or distortion . . . just a constant gain level through local or DX QSO. There's an audio response control for CW peaking or VHF scatter work an active nulling Q multiplier for 50-60 db notches, complete with depth control an unusual noise limiter which cuts impulse noise without signal distortion, plus adjustable CW/SSB limiting. Even external provision for RF gain control for CW break-in operation and an accessory socket for receiver accessories or adapters are included.

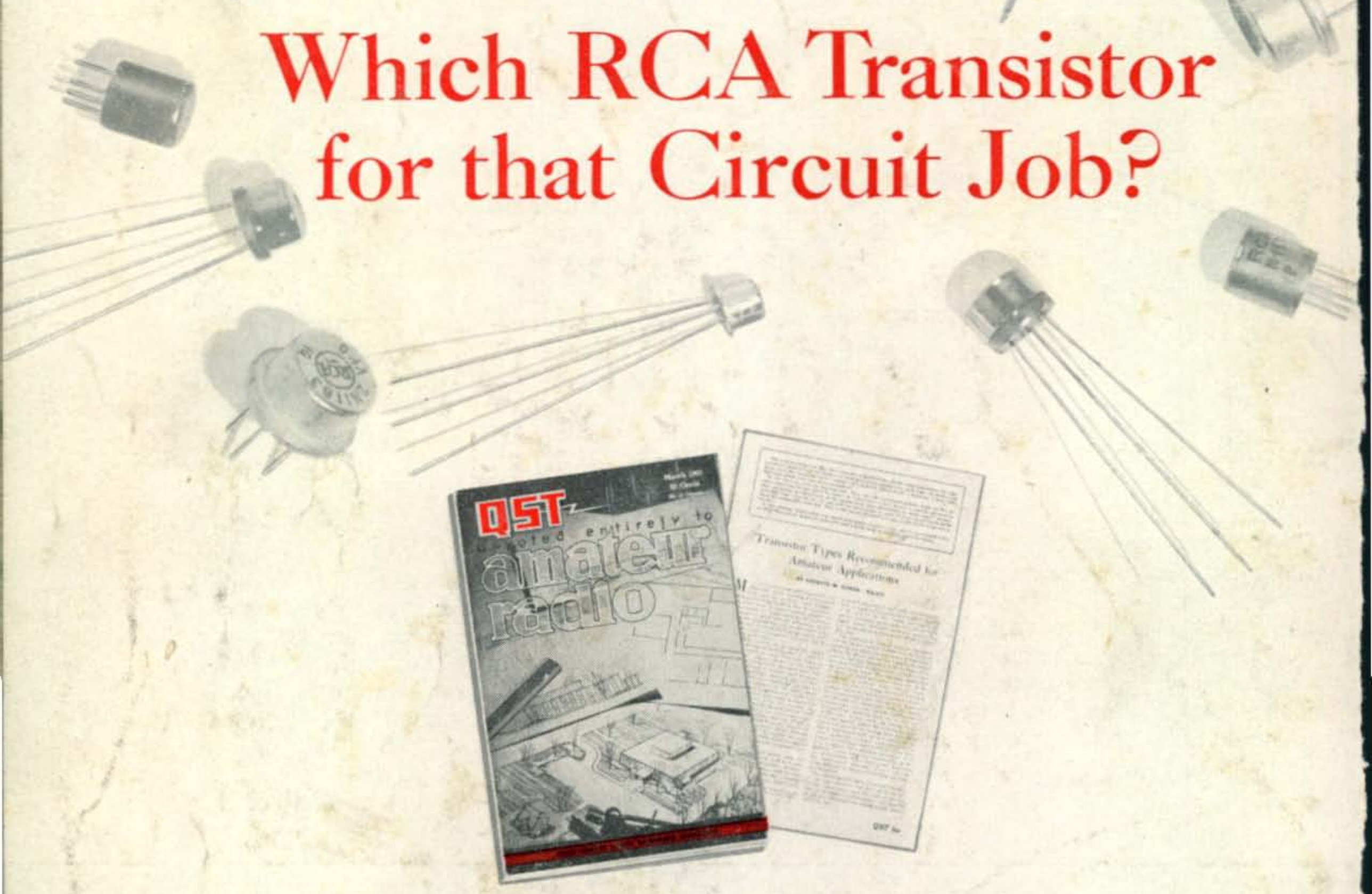
The NC-303 was not designed to meet competitive price or performance, but to provide maximum hamband performance for every type of operation. Not just SSB, not just AM, not just CW . but every mode. As a result, it costs more than the average ham receiver. On the other hand, if your requirements are for more than "the average", perhaps the '303 should be your next receiver. Why not operate one soon and find out?

NATIONAL ONE YEAR GUARANTEE

National Radio Co., Inc.®

A Wholly Owned Subsidiary of National Company, Inc. • 37 Washington Street, Melrose 76, Massachusetts
Export: Ad Auriema Inc., 85 Broad St., N.Y.C. • Canada: Tri-Tel Assoc., 81 Shepard Ave. W., Willowdale, Ontario

Which RCA Transistor for that Circuit Job?



See the article by W2OUY

The article appeared in QST, March, 1962.

It will serve as a dependable and valuable guide when you are choosing from nearly 100 transistors and silicon rectifiers for specific applications. W2OUY covers the transistor types recommended for receiver rf, preamplifier, if, local oscillator, and converter stages. He points out the types to use in transmitter oscillators and rf amplifiers. In addition, the article lists types for audio stages, inverters, dc/dc converters, and voltage regulators. And there is a handy chart classifying 17 rectifiers having ratings ranging from 50 to 800 volts (PRV)—at dc loads of 500 and 750 milliamperes.

RCA offers one of the most complete lines of high-quality transistors and silicon rectifiers for amateur radio. And your RCA Industrial Semiconductor Distributor handles every one.

HAM TIPS

Volume 21, No. 4 tells how to use RCA transistors in rf power amplifiers. Includes practical theory, transmitter circuits, a modulation technique, and on-air operation. Get a free copy from your RCA Industrial Semiconductor Distributor. Or write: Sect. H-15-SD, Commercial Engineering, RCA Electron Tube Division, Harrison, N. J.

The Most Trusted Name in Electronics